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Autore	Smith, Gilbert Morgan
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Nota di contenuto	THERMODYNAMICS AND INTRODUCTORY STATISTICAL MECHANICS; CONTENTS; PREFACE; 1 INTRODUCTORY REMARKS; 1.1 Scope and Objectives; 1.2 Level of Course; 1.3 Course Outline; 1.4 Books; PART I THERMODYNAMICS; 2 BASIC CONCEPTS AND DEFINITIONS; 2.1 Systems and Surroundings; 2.2 State Variables and Thermodynamic Properties; 2.3 Intensive and Extensive Variables; 2.4 Homogeneous and Heterogeneous Systems, Phases; 2.5 Work; 2.6 Reversible and Quasi-Static Processes; 2.6.1 Quasi-Static Process; 2.6.2 Reversible Process; 2.7 Adiabatic and Diathermal Walls; 2.8 Thermal Contact and Thermal Equilibrium 3 THE LAWS OF THERMODYNAMICS I3.1 The Zeroth Law-Temperature; 3.2 The First Law-Traditional Approach; 3.3 Mathematical Interlude I: Exact and Inexact Differentials; 3.4 The First Law-Axiomatic Approach; 3.5 Some Applications of the First Law; 3.5.1 Heat Capacity; 3.5.2 Heat

and Internal Energy; 3.5.3 Heat and Enthalpy; 3.6 Mathematical Interlude II: Partial Derivatives; 3.6.1 Relations Between Partial of Dependent Variables; 3.6.2 Relations Between Partial with Different Subscripts; 3.7 Other Applications of the First Law; 3.7.1  $C(P) - C(V)$ ; 3.7.2 Isothermal Change, Ideal Gas; 3.7.3 Adiabatic Change, Ideal Gas; 3.7.4 The Joule and the Joule-Thomson Coefficients; 4 THE LAWS OF THERMODYNAMICS II; 4.1 The Second Law-Traditional Approach; 4.2 Engine Efficiency: Absolute Temperature; 4.2.1 Ideal Gas; 4.2.2 Coupled Cycles; 4.3 Generalization: Arbitrary Cycle; 4.4 The Clausius Inequality; 4.5 The Second Law-Axiomatic Approach (Caratheodory); 4.6 Mathematical Interlude III: Pfaffian Differential Forms; 4.7 Pfaffian Expressions in Two Variables; 4.8 Pfaffian Expressions in More Than Two Dimensions; 4.9 Caratheodory's Theorem; 4.10 Entropy-Axiomatic Approach; 4.11 Entropy Changes for Nonisolated Systems; 4.12 Summary; 4.13 Some Applications of the Second Law; 4.13.1 Reversible Processes (PV Work Only); 4.13.2 Irreversible Processes; 5 USEFUL FUNCTIONS: THE FREE ENERGY FUNCTIONS; 5.1 Mathematical Interlude IV: Legendre Transformations; 5.1.1 Application of the Legendre Transformation; 5.2 Maxwell Relations; 5.3 The Gibbs-Helmholtz Equations; 5.4 Relation of  $DA$  and  $DG$  to Work: Criteria for Spontaneity; 5.4.1 Expansion and Other Types of Work; 5.4.2 Comments; 5.5 Generalization to Open Systems and Systems of Variable Composition; 5.5.1 Single Component System; 5.5.2 Multicomponent Systems; 5.6 The Chemical Potential; 5.7 Mathematical Interlude V: Euler's Theorem; 5.8 Thermodynamic Potentials; 6 THE THIRD LAW OF THERMODYNAMICS; 6.1 Statements of the Third Law; 6.2 Additional Comments and Conclusions; 7 GENERAL CONDITIONS FOR EQUILIBRIUM AND STABILITY; 7.1 Virtual Variations; 7.2 Thermodynamic Potentials-Inequalities; 7.3 Equilibrium Condition From Energy; 7.3.1 Boundary Fully Heat Conducting, Deformable, Permeable (Normal System); 7.3.2 Special Cases: Boundary Semi-Heat Conducting, Semi-Deformable, or Semi-Permeable; 7.4 Equilibrium Conditions From Other Potentials

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Sommario/riassunto

In this clear and concise introduction to thermodynamics and statistical mechanics the reader, who will have some previous exposure to thermodynamics, will be guided through each of the two disciplines separately initially to provide an in-depth understanding of the area and thereafter the connection between the two is presented and discussed. In addition, mathematical techniques are introduced at appropriate times, highlighting such use as: exact and inexact differentials, partial derivatives, Caratheodory's theorem, Legendre transformation, and combinatory analysis.\* Emphasis is place

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