

Contents

CHAPTER 1	Greek Physics	1
CHAPTER 2	Greek Astronomy	9
CHAPTER 3	Pre-Galilean Science	17
CHAPTER 4	The Physics of Galileo	34
CHAPTER 5	Newton and His Physics: The Nature of Theory	43
	Time as a Basic Entity	57
	The Concept of Speed	58
	The Concept of Velocity	61
	The Concept of Acceleration	62
	Laws of Motion—The Concept of Force	65
CHAPTER 6	Newton's Law of Gravity and His Contemporaries	69
CHAPTER 7	The Post-Newtonian Era: Dynamic Conservation Principles	89
	Conservation of Momentum	90
	The Concept of Energy	94
	Conservation of Energy	98
	Conservation of Angular Momentum	100

CHAPTER 8	The Post-Newtonian Era: Minimal Principles and Lagrangian and Hamiltonian Mechanics	104
	The Concept of Action	104
	Hamilton's Principle of Least Action	106
	The Contributions of Lagrange	113
CHAPTER 9	The Growth of Optics, Electricity, and Magnetism	122
	The End of the Newtonian Era	122
	Post-Newtonian Optics	123
	Electricity and Magnetism	125
	Electric and Magnetic Fields	128
	Dynamics of Electric Currents	132
CHAPTER 10	The Faraday–Maxwell Era	138
	The Discovery of Electromagnetic Induction	144
	Maxwell's Electromagnetic Theory	146
	Maxwell's Electromagnetic Theory of Light	152
CHAPTER 11	The Broadest Laws of Physics: Thermodynamics, Kinetic Theory, and Statistical Mechanics	156
	Thermodynamics	157
	Kinetic Theory	177
	Statistical Mechanics	182
CHAPTER 12	Origin of the Quantum Theory	190
CHAPTER 13	Planck's Black-Body Radiation Formula and Einstein's Photon	204
	Einstein's Contribution to the Quantum Theory	212
CHAPTER 14	Experimental Physics at the Close of the Nineteenth Century	217
CHAPTER 15	Albert Einstein and the Theory of Relativity	241
	The Revolutionary Nature of the Theory of Relativity	251
	The General Theory of Relativity	262

CHAPTER 16	Atomic Theory: The Bohr Atom	268
CHAPTER 17	Quantum Mechanics	282
	Quantum Electrodynamics	302
CHAPTER 18	Nuclear Physics	308
CHAPTER 19	Particle Physics	329
CHAPTER 20	Cosmology	356
Epilogue		384
Notes		391
Recommended Readings		399
Index		403