



CONTENTS

5 7 4 6 - - -

CHAPTER SKELETONS WITH EXAMS	ix
Chapter 1 MATHEMATICAL INTRODUCTION	1
1.1 Planar Vectors, Scientific Notation, and Units / 1.2 Three-Dimensional Vectors; Dot and Cross Products	
Chapter 2 EQUILIBRIUM OF CONCURRENT FORCES	21
2.1 Ropes, Knots, and Frictionless Pulleys / 2.2 Friction and Inclined Planes / 2.3 Graphical and Other Problems	
Chapter 3 KINEMATICS IN ONE DIMENSION	36
3.1 Dimensions and Units; Constant-Acceleration Problems	
Chapter 4 NEWTON'S LAWS OF MOTION	51
4.1 Force, Mass, and Acceleration / 4.2 Friction; Inclined Planes; Vector Notation / 4.3 Two-Object and Other Problems	
Chapter 5 MOTION IN A PLANE I	76
5.1 Projectile Motion / 5.2 Relative Motion	
Chapter 6 MOTION IN A PLANE II	94
6.1 Circular Motion; Centripetal Force / 6.2 Law of Universal Gravitation; Satellite Motion / 6.3 General Motion in a Plane	
Chapter 7 WORK AND ENERGY	111
7.1 Work Done by a Force / 7.2 Work, Kinetic Energy, and Potential Energy / 7.3 Conservation of Mechanical Energy / 7.4 Additional Problems	
Chapter 8 POWER AND SIMPLE MACHINES	136
8.1 Power / 8.2 Simple Machines	
Chapter 9 IMPULSE AND MOMENTUM	146
9.1 Elementary Problems / 9.2 Elastic Collisions / 9.3 Inelastic Collisions and Ballistic Pendulums / 9.4 Collisions in Two Dimensions / 9.5 Recoil and Reaction / 9.6 Center of Mass (see also Chap. 10)	
Chapter 10 STATICS OF RIGID BODIES	176
10.1 Equilibrium of Rigid Bodies / 10.2 Center of Mass (Center of Gravity)	
Chapter 11 ROTATIONAL MOTION I: KINEMATICS AND DYNAMICS	207
11.1 Angular Motion and Torque / 11.2 Rotational Kinematics / 11.3 Torque and Rotation / 11.4 Moment of Inertia / 11.5 Translational-Rotational Relationships / 11.6 Problems Involving Cords Around Cylinders, Rolling Objects, etc.	
Chapter 12 ROTATIONAL MOTION II: KINETIC ENERGY, ANGULAR IMPULSE, ANGULAR MOMENTUM	228
12.1 Energy and Power / 12.2 Angular Impulse; the Physical Pendulum / 12.3 Angular Momentum	
Chapter 13 MATTER IN BULK	247
13.1 Density and Specific Gravity / 13.2 Elastic Properties	

Chapter 14	SIMPLE HARMONIC MOTION 14.1 Oscillations of a Mass on a Spring / 14.2 SHM of Pendulums and Other Systems	256
Chapter 15	HYDROSTATICS 15.1 Pressure and Density / 15.2 Pascal's and Archimedes' Principles; Surface Tension	271
Chapter 16	HYDRODYNAMICS 16.1 Equation of Continuity, Bernoulli's Equation, Torricelli's Theorem / 16.2 Viscosity, Stokes' Law, Poiseuille's Law, Turbulence, Reynolds Number	285
Chapter 17	TEMPERATURE AND THERMAL EXPANSION 17.1 Temperature Scales; Linear Expansion / 17.2 Area and Volume Expansion	297
Chapter 18	HEAT AND CALORIMETRY 18.1 Heat and Energy; Mechanical Equivalent of Heat / 18.2 Calorimetry, Specific Heats, Heats of Fusion and Vaporization	307
Chapter 19	HEAT TRANSFER 19.1 Conduction / 19.2 Convection / 19.3 Radiation	316
Chapter 20	GAS LAWS AND KINETIC THEORY 20.1 The Mole Concept; the Ideal Gas Law / 20.2 Kinetic Theory / 20.3 Atmospheric Properties; Specific Heats of Solids	326
Chapter 21	THE FIRST LAW OF THERMODYNAMICS 21.1 Basic Thermodynamic Concepts / 21.2 The First Law of Thermodynamics, Internal Energy, p - V Diagrams, Cyclic Systems	345
Chapter 22	THE SECOND LAW OF THERMODYNAMICS 22.1 Heat Engines; Kelvin - Planck and Clausius Statements of the Second Law / 22.2 Entropy	357
Chapter 23	WAVE MOTION 23.1 Characteristic Properties / 23.2 Standing Waves and Resonance	366
Chapter 24	SOUND 24.1 Sound Velocity; Beats; Doppler Shift / 24.2 Power, Intensity, Reverberation Time, Shock Waves	379
Chapter 25	COULOMB'S LAW AND ELECTRIC FIELDS 25.1 Coulomb's Law of Electrostatic Force / 25.2 The Electric Field; Continuous Charge Distributions; Motion of Charged Particles in an Electric Field / 25.3 Electric Flux and Gauss's Law	387
Chapter 26	ELECTRIC POTENTIAL AND CAPACITANCE 26.1 Potential Due to Point Charges or Charge Distributions / 26.2 The Potential Function and the Associated Electric Field / 26.3 Energetics; Problems with Moving Charges / 26.4 Capacitance and Field Energy / 26.5 Capacitors in Combination	407
Chapter 27	SIMPLE ELECTRIC CIRCUITS 27.1 Ohm's Law, Current, Resistance / 27.2 Resistors in Combination / 27.3 EMF and Electrochemical Systems / 27.4 Electric Measurement / 27.5 Electric Power / 27.6 More Complex Circuits, Kirchhoff's Circuit Rules, Circuits with Capacitance	432
Chapter 28	THE MAGNETIC FIELD 28.1 Force on a Moving Charge / 28.2 Force on an Electric Current / 28.3 Torque and Magnetic Dipole Moment / 28.4 Sources of the Magnetic Field; Law of Biot and Savart / 28.5 More Complex Geometries; Ampère's Law	467

Chapter 29	MAGNETIC PROPERTIES OF MATTER 29.1 The H and M Fields; Susceptibility; Relative Permeability / 29.2 Magnets; Pole Strength	510
Chapter 30	INDUCED EMF: GENERATORS AND MOTORS 30.1 Change in Magnetic Flux, Faraday's Law, Lenz's Law / 30.2 Motional EMF; Induced Currents and Forces / 30.3 Time-Varying Magnetic and Induced Electric Fields / 30.4 Electric Generators and Motors	526
Chapter 31	INDUCTANCE 31.1 Self-Inductance / 31.2 Mutual Inductance: The Ideal Transformer	552
Chapter 32	ELECTRIC CIRCUITS 32.1 R - C , R - L , L - C and R - L - C Circuits; Time Response / 32.2 AC Circuits in the Steady State / 32.3 Time Behavior of AC Circuits	566
Chapter 33	ELECTROMAGNETIC WAVES 33.1 Displacement Current, Maxwell's Equations, the Speed of Light / 33.2 Mathematical Description of Waves in One and Three Dimensions / 33.3 The Component Fields of an Electromagnetic Wave; Induced EMF / 33.4 Energy and Momentum Fluxes	590
Chapter 34	LIGHT AND OPTICAL PHENOMENA 34.1 Reflection and Refraction / 34.2 Dispersion and Color / 34.3 Photometry and Illumination	607
Chapter 35	MIRRORS, LENSES, AND OPTICAL INSTRUMENTS 35.1 Mirrors / 35.2 Thin Lenses / 35.3 Lensmaker's Equation; Composite Lens Systems / 35.4 Optical Instruments: Projectors, Cameras, the Eye / 35.5 Optical Instruments: Microscopes and Telescopes	634
Chapter 36	INTERFERENCE, DIFFRACTION, AND POLARIZATION 36.1 Interference of Light / 36.2 Diffraction and the Diffraction Grating / 36.3 Polarization of Light	668
Chapter 37	SPECIAL RELATIVITY 37.1 Lorentz Transformation, Length Contraction, Time Dilation, and Velocity Transformation / 37.2 Mass-Energy Relation; Relativistic Dynamics	688
Chapter 38	PARTICLES OF LIGHT AND WAVES OF MATTER 38.1 Photons and the Photoelectric Effect / 38.2 Compton Scattering; X-rays; Pair Production and Annihilation / 38.3 de Broglie Waves and the Uncertainty Principle	708
Chapter 39	MODERN PHYSICS: ATOMS, NUCLEI, SOLID-STATE ELECTRONICS 39.1 Atoms and Molecules / 39.2 Nuclei and Radioactivity / 39.3 Solid-State Electronics	720
	INDEX	737