Contents

Preface xi



Cellular & Molecular Basis for Medical Physiology 1

- General Principles & Energy Production in Medical Physiology 3
- Overview of Cellular Physiology in Medical Physiology 33
- 3 Immunity, Infection, & Inflammation 67
- 4 Excitable Tissue: Nerve 85
- 5 Excitable Tissue: Muscle 99
- Synaptic & Junctional Transmission 121
- 7 Neurotransmitters & Neuromodulators 137



Central & Peripheral Neurophysiology 157

- Somatosensory Neurotransmission: Touch, Pain, & Temperature 159
- Vision 177
- Hearing & Equilibrium 199
- Smell & Taste 217
- Reflex & Voluntary Control of Posture & Movement 227

- 13 Autonomic Nervous System 255
- Electrical Activity of the Brain, Sleep– Wake States, & Circadian Rhythms 269
- 15 Learning, Memory, Language,& Speech 283



Endocrine & Reproductive Physiology 297

- 16 Basic Concepts of Endocrine Regulation 299
- 17 Hypothalamic Regulation of Hormonal Functions 307
- 18 The Pituitary Gland 321
- 19 The Thyroid Gland 337
- 20 The Adrenal Medulla & Adrenal Cortex 351
- 21 Hormonal Control of Calcium, & Phosphate Metabolism & the Physiology of Bone 375
- Reproductive Development & Function of the Female Reproductive System 389
- 23 Function of the Male Reproductive System 417
- 24 Endocrine Functions of the Pancreas& Regulation of CarbohydrateMetabolism 429



Gastrointestinal Physiology 451

- 25 Overview of Gastrointestinal Function & Regulation 453
- 26 Digestion, Absorption, & Nutritional Principles 475
- 27 Gastrointestinal Motility 495
- 28 Transport & Metabolic Functions of the Liver 507



Cardiovascular Physiology 517

- Origin of the Heartbeat & the Electrical Activity of the Heart 519
- 30 The Heart as a Pump 537
- 31 Blood as a Circulatory Fluid & the Dynamics of Blood & Lymph Flow 553
- 32 Cardiovascular Regulatory Mechanisms 585
- 33 Circulation Through Special Regions 601



Respiratory Physiology 619

- 34 Introduction to Pulmonary Structure & Mechanics 621
- 35 Gas Transport & pH 639
- 36 Regulation of Respiration 655



Renal Physiology 669

- 37 Renal Function & Micturition 671
- 38 Regulation of Extracellular Fluid Composition & Volume 695
- 39 Acidification of the Urine & Bicarbonate Excretion 709

Answers to Multiple Choice Questions 719
Index 721