

# Contents

Preface xi

## SECTION I

### Cellular & Molecular Basis for Medical Physiology 1

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

## SECTION II

### Central & Peripheral Neurophysiology 157

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

## SECTION V

### Gastrointestinal Physiology 451

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

## SECTION III

### 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
- 22 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 Carbohydrate Metabolism 429

## SECTION

## IV

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

## SECTION

## V

Cardiovascular  
Physiology 517

- 29** 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

## SECTION

## VI

## Respiratory Physiology 619

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

## SECTION

## VII

## 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