

Contents

PART I

RADIOLOGIC PHYSICS, 1

- 1 Essential Concepts of Radiologic Science, 2
- 2 Basic Physics Primer, 17
- 3 The Structure of Matter, 34
- 4 Electromagnetic Energy, 53
- 5 Electricity, Magnetism, and Electromagnetism, 69

PART II

X-RADIATION, 91

- 6 The X-ray Imaging System, 92
- 7 The X-ray Tube, 111
- 8 X-ray Production, 129
- 9 X-ray Emission, 142
- 10 X-ray Interaction With Matter, 153

PART III

X-RAY IMAGING, 169

- 11 Computed Radiography, 170
- 12 Digital Radiography, 182
- 13 Digital Radiographic Technique, 189
- 14 Image Acquisition, 202
- 15 Scatter Radiation, 213
- 16 Digital Image Descriptors and Evaluation, 233
- 17 Radiographic Artifacts, 247

PART IV

ADVANCED MEDICAL IMAGING, 259

- 18 Mammography, 260
- 19 Fluoroscopy, 274
- 20 Interventional Radiology, 288
- 21 Computed Tomography, 305
- 22 Tomosynthesis, 331

PART V

MEDICAL IMAGE DISPLAY, 343

- 23 Patient-Image Optimization, 344
- 24 Viewing the Medical Image, 350
- 25 Medical Image Informatics, 360
- 26 Digital Display Device, 368

PART VI

THE MEDICAL IMAGE, 377

- 27 Imaging Science, 378
- 28 Artificial Intelligence, 395
- 29 Quantum Computing, 406
- 30 Image Perception, 417

PART VII

RADIOBIOLOGY, 427

- 31 Human Biology, 428
- 32 Fundamental Principles of Radiobiology, 441
- 33 Molecular Radiobiology, 449
- 34 Cellular Radiobiology, 456
- 35 Deterministic Effects of Radiation, 465
- 36 Stochastic Effects of Radiation, 481

PART VIII

RADIATION PROTECTION, 499

- 37 Health Physics, 500
- 38 Designing for Radiation Protection, 510
- 39 Radiography/Fluoroscopy Patient Radiation Dose, 527
- 40 Computed Tomography Patient Radiation Dose, 538
- 41 Patient Radiation Dose Management, 548
- 42 Occupational Radiation Dose Management, 559

Index, 576