Contents

Chapter 1 **Cell and Tissues** **1**

Cell 1
Cell Division 2
Cell Metabolism 5
Tissues 6
Liquid Connective Tissue 11

Chapter 2 **Microscopy** **17**

History of Optical Microscope 17
Basic Terminology in Microscopy 17
Parts of Microscope 18
Care of Microscope 20
Types of Microscopy 21
Bright Field Microscopy 21
Dark Field Microscopy 22
Phase Contrast Microscopy 24
Fluorescence Microscopy 24
Electron Microscopy 25
Types of Electron Microscope 26
Confocal Scanning Optical Microscopy 28
Deconvolution Microscopy and Image Reconstruction 29
Polarization Light Microscopy 29

Chapter 3 **Introduction and Importance of Histopathology** **32**

Importance of Histopathology 32
Decomposition and Putrefaction 32
Various Steps of Histological Techniques 33
Specimen Collection 33
Logging of Specimen 34
Tissue Marking and Orientation 36
Methods of Examination of Tissues 37
Special Instructions on Specimen Collection and Handling 37
Duties and Responsibilities 38

Chapter 4 Tissue Fixation **40**

Functions of fixatives 40
Properties of Fixatives 40
Types of Fixatives 41
Properties and Action of Some Important Fixatives 42
Fixation of Specific Substances 48
Artefacts 47
Preservation and Storage of Tissues 48
Points to be Remember During Fixation of Tissues 48
Special Fixatives for Special Tissue Samples 48

Chapter 5 Decalcification **51**

Properties of Decalcifying Agents 51
Technique of Decalcification 51
Tests for Completion of Decalcification 52
Decalcifying Agents 53
Treatment after Decalcification 54
Surface Decalcification 54
Factors Affecting the Rate of Decalcification 55
Tips for Proper Decalcification 55

Chapter 6 Tissue Processing **57**

Principle of Tissue Processing 57
Selection and Labeling of Tissues 57
Completion of Fixation before Processing 57
Post-fixation Procedures 57
Dehydration 58
Clearing 59
Impregnation and Infiltration 61
Automatic Tissue Processing 64
Manual Tissue Processing 66
Paraffin Wax Embedding 70
Storage of Paraffin Blocks 71
Celloidin and Low Viscosity Nitrocellulose Embedding 72
Gelatin Embedding 72
Plastic Embedding 73
Resin Embedding 73
Double Embedding 74
Re-embedding 74

Chapter 7 Microtomy and Section Cutting **77**

Microtomes 77
Microtome Knives 79
Section Cutting 83
Attaching the Sections to Slides 89

Chapter 8 Frozen Sections and Cryostat **93**

Principle of Frozen Sections 93
Theory of Freezing 93
Cryoprotectants 94
Cryogen selection 94
Freezing Microtome 95
Methods of Cutting Frozen Sections 95

Chapter 9 Staining **100**

Principle of Staining 100
Types of Dyes and Stains 101
Classification of Dyes or Stains 102
Types of Staining Processes 103
Staining Procedures 106
Hematoxylin Stains 107
Counter Stains 109
Standard Hematoxylin and Eosin Staining Method for Paraffin Sections 110
Special Staining Methods 110
Staining of Frozen Sections 123
Precautions Taken during Staining 125
Causes of Poor Staining 125

Chapter 10 Mounting of Sections **129**

Characteristics of Mountant 129
Types of Mountant 129
Restaining 133
Labeling and Storage of Slides 133
Coverslips 133
Ringing Media 133

Chapter 11 Cytopathology **135**

Types of Exfoliation 135
General Cytological Changes in Cells during Malignancy 135
Cytology of Normal Genital Tract 136
Methods of Specimen Collection and Submission 137
Gynecological Sample Collection 138
Non-gynecological sample collection 140
Fine Needle Aspiration Cytology 142
Preservation of cytological specimens 144
Preparation of Smears 145
Fixation and Fixatives 146
Cytological Staining Techniques 148
Special Stains 150
Mounting of Smear of Cell Samples 154

Chapter 12 Museum Techniques **156**

Functions of Pathology Museum 156
Safety in the Museum 159

Chapter 13 Safety in Histopathology Laboratory **160**

Staff Training 160
Basic Organization and Common Sense 160
Infectious Hazards 160
Radiations Hazard 161
Equipment Hazards 162
Practical Safety in Routine Use 162

Chapter 14 Advances in Histopathology and Cytopathology **165**

Microwave Irradiation of Primary Tissue Fixation 165
Ultrasonic Decalcification 165
Microwave-stimulated Tissue Processing 166
Ultrasound-stimulated Tissue Processing 167
Automatic Knife Sharpners 168
Ultramicrotomy 168
Automatic Staining Method 169
Endoscopy 169
Colposcopy 170
Autoradiography 171
Immunohistochemistry 172
Tissue Microarrays 173

Chapter 15 Solution and Reagents **176**

Important Definitions 176
Preparation of Standard Solutions 176

Bibliography *179*

Glossary *181*

Index *187*