Preparatory Manual of

Second **Edition**

Pathology for Medical Laboratory Technology Students

is the first book available for medical laboratory technology students, covering all theoretical and practical aspects, related to pathology. It is written in a simplified manner so that the student can grasp the subject easily and can recall it while writing examination. It contains flowcharts, color diagrams, microphotographs in each section, which makes the text easy to understand and thus can be easily reproducible during exams. Strict guidelines, with respect to the course of professional university examinations are followed while writing the content of the book. Technical aspects in relation to laboratory medicine have been dealt accurately.

This edition, comprising 86 chapters, features completely revised and modified text in accordance to the recent guidelines and protocols.

Highlights of important topics covered in each section

- Hematology portion of laboratory medicine given in detail, including practical and technical aspects of hematology laboratory, stains, bone marrow examination and coagulation profile.
- Histological techniques portion of laboratory medicine covered in detail, including routine stains, special stains, tissue processing, and fixatives.
- · Histopathology and cytopathology portion discussed in detail, including automation, specimen management, and electron microscopy
- · Laboratory management portion included in detail, including quality control, Job analysis, record
- · Clinical pathology portion of laboratory medicine discussed in detail, including fluids, urine examination
- Transfusion medicine and immune-hematology section of laboratory medicine, including blood grouping, cross-matching, and plasmapheresis
- · Management of Covid-19 samples in laboratory is the newly added section in the second edition of the

Sonam Kumar Pruthi MBBS, MD (Pathology) is currently Specialist Pathologist, Hindu Rao Hospital and NDMC Medical College, Delhi. After finishing his MBBS and MD Pathology from Manipal Academy of Higher Education, Karnataka, he worked as a Junior Consultant, Department of Hematology, National Reference Laboratory of Dr Lal PathLabs, Rohini, New Delhi, following which he completed his senior residency from Dr Baba Saheb Ambedkar Hospital and Medical College, Rohini, New Delhi. He is an acclaimed author of other five books Comprehensive Review of Pathology, Preparatory Manual of Pathology for Undergraduate Students, My Pathology Notes for FMGE, Dermatopathology with a Clinical Base: Text and Atlas and Handbook of Reporting for Practicing Modern Pathology.

Namrata Sarin MBBS, MD (Pathology) is currently Head, Department of Pathology and Blood Bank, Hindu Rao Hospital and NDMC Medical College, Delhi. After completing her postgraduation, she did her senior residency from Lady Hardinge Medical College, New Delhi. She has been Associate Professor, ASCOMS and Hospital, Jammu, for 7 years. She holds immense interest in histopathology and dermatopathology and also the training course of BSc (MLT) at Hindu Rao Hospital is being run under her guidance and supervision.



Sompal Singh BSc (Statistics), MBBS, MD (Pathology), MBA (Hospital Administration) is currently Senior Specialist, Department of Pathology, and in-charge Blood Bank, Hindu Rao Hospital and NDMC Medical College, Delhi. He was a part of research project on cell culture during his senior research associateship from CSIR, New Delhi. He has to his credit more than 150 research publications in various reputed national and international journals. He is also author of Biomedical Statistics: A



Beginner's Guide and also a coauthor of two other books, one meant for paramedical students and the other for medical undergraduate students.



CBS Publishers & Distributors Pvt Ltd

4819/XI, Prahlad Street, 24 Ansari Road, Daryaganj, New Delhi 110 002, India New Delhi | Bengaluru | Chennai | Kochi | Kolkata | Lucknow | Mumbai



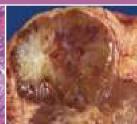


Preparatory Manual of

Pathology

for Medical Laboratory Technology Students









Second

Edition

Sonam Kumar Pruthi Namrata Sarin Sompal Singh



CBS Publishers & Distributors Pvt Ltd



Contents

| Foreword by Shrijeet Chakraborti | vii | | | |
|---|-----|--|--|--|
| Preface to the Second Edition | ix | | | |
| Preface to the First Edition | xi | | | |
| Section I: Hematology | | | | |
| 1. Red Blood Cells and Anemia | 3 | | | |
| 2. Laboratory Tests in Bleeding Disorders | 6 | | | |
| 3. Automation in Hematology | 10 | | | |
| 4. Bone Marrow Examination | 12 | | | |
| 5. Cellular Components in Blood Film | 14 | | | |
| 6. Coagulation Cascade | 16 | | | |
| 7. Composition and Functions of Blood | 18 | | | |
| 8. Coombs' Test (Anti-globin Test) | 19 | | | |
| 9. Erythropoiesis | 21 | | | |
| 10. Erythrocyte Sedimentation Rate (ESR) | 22 | | | |
| 11. Hemoglobin Estimation | 24 | | | |
| 12. Hemoglobin and its Variants | 26 | | | |
| 13. Hemostasis | 29 | | | |
| 14. LE Cell | 31 | | | |
| 15. Leukopoiesis | 32 | | | |
| 16. Leukemia | 33 | | | |
| 17. Osmotic Fragility Test | 35 | | | |
| 18. Packed Cell Volume (PCV) | 37 | | | |
| 19. Phlebotomy | 39 | | | |
| 20. Platelets | 41 | | | |
| 21. Red Cell Indices | 43 | | | |
| 22. Reticulocyte Count | 44 | | | |
| 23. Sickling Test | 46 | | | |
| 24. Total Leukocyte Count | 47 | | | |
| 25. White Blood Cells (WBCs) | 50 | | | |

| Section II: Histological lechniques | 5 |
|---|------------|
| 26. Stains for Amyloid | 55 |
| 27. Cryostat | 56 |
| 28. Cytochemical Stains | 58 |
| 29. Fixatives | 61 |
| 30. Hematoxylin and Eosin Stain | 64 |
| 31. Masson-Fontana Silver Stain | 66 |
| 32. Microbial Staining | 67 |
| 33. Microtomy | 69 |
| 34. Classification of Pigments | 71 |
| 35. Mucin Stains | 73 |
| 36. Museum Techniques | 76 |
| 37. Oil Red O Stain | 78 |
| 38. Pap (Papanicolaou) Stain | 79 |
| 39. Romanowsky Stain | 81 |
| 40. Stains used for Collagen Demonstration | 83 |
| 41. Tissue Processing | 85 |
| Section III: Histopathology and Cytol | ogy |
| 42. Automation in Cytology | 91 |
| 43. Automation in Histopathology | 92 |
| 44. Electron Microscopy | 93 |
| 45. Photography and Gross Microphotography | 95 |
| 46. Grossing and Specimen Management | 96 |
| 47. Management of Cytological Specimen | 97 |
| 48. Sources, Types of Cytological and Histopathological Spe | ecimens 98 |
| Section IV: Laboratory Manageme | nt |
| 49. Biomedical Waste (BMW) Management | 101 |
| 50. Hospital Organization and Operations | 103 |
| 51. Internal Quality Control Involving Quantitative Results | 105 |
| 52. Inventories | 107 |
| 53. Job Analysis | 108 |
| 54. Management Review Meetings | 109 |
| 55. Maintenance of Laboratory Refrigerators, Freezers and | |
| Other Equipment | 110 |
| 56. Material Safety Data Sheet (MSDS) | 112 |
| 57. Medical Ethics and their Role in Laboratory Medicine | 113 |

| | Contents | xvii |
|--------------------------|--|---------|
| 58. Principles of Labo | oratory Management | 115 |
| 59. Quality Control | 7 0 | 117 |
| 60. Quality Control in | n Cytology | 119 |
| 61. Quality Assuranc | , ,, | 121 |
| 62. Quality Control in | 9, | 123 |
| 63. Record Keeping i | n Laboratory | 126 |
| 64. Role of Medical L | aboratory Technology in Healthcare | 127 |
| 65. Setting up of a Blo | ood Bank | 128 |
| 66. Biohazardous Wa | aste Management (Spill Management) | 131 |
| 67. Standard Operati | ng Procedure (SOP) | 132 |
| 68. Statistical use in a | a Clinical Laboratory | 134 |
| 69. Turnaround Time | ! | 135 |
| 70. Disposal of Patho | ological Waste | 137 |
| | Section V: Clinical Pathology | |
| 71. Fluids | | 141 |
| 72. Semen Analysis | | 144 |
| 73. Sputum Examinat | ion | 146 |
| 74. Stool Examination | า | 148 |
| 75. Collection and Pr | ocessing of Urine | 150 |
| | Section VI: Transfusion Medicine | |
| 76. Blood Group Syst | tems | 157 |
| 77. Blood Grouping | | 159 |
| 78. Blood Banking | | 160 |
| 79. Crossmatching | | 162 |
| 80. Transfusion Reac | tions | 163 |
| 81. Blood Componer | nts | 165 |
| 82. Plasmapheresis | | 167 |
| 83. Record Keeping i | n Blood Bank | 168 |
| 84. Antibody | | 169 |
| Section VII: I | Management of COVID-19 Samples in Labo | oratory |
| 85. Laboratory Diagn | | 173 |
| Samples in Labor | Handling and Processing of atories | 176 |
| Index | | 179 |
| | | |