

Human Anatomy and Physiology

Practical Workbook Course Codes: BP107P and BP207P

for First and Second Semesters Bachelor in Pharmacy

covers practicals of anatomy and physiology for first and second semesters of Bachelor in Pharmacy courses (Course codes BP107P and BP207P) and serves as a handy and smart workbook for recording the practicals in a formal way.

The section on practicals of anatomy covers study of the microscope; microscopic study of epithelial, connective, muscular and nervous tissues; and identification of axial and appendicular bones.

The section on practicals of physiology includes introduction to hemocytometry, counting of RBC, WBC; determination of bleeding and clotting time; estimation of hemoglobin; determination of blood group, erythrocyte sedimentation rate (ESR), heart rate, pulse rate; and lastly recording of blood pressure.

Anatomy part of practicals for Semester II students gives the diagrams of digestive, respiratory, cardiovascular, urinary and reproductive systems: The structures in these illustrations have to be studied and learnt with the help of the text from the main textbooks. Histological slides of vital organs like heart, lung, liver, kidney, cerebrum, cerebellum, ovary, testis with three points of identification have to be studied. These histological slides should also be viewed under the microscope.

Physiology practicals include study of diagrams of integumentary system, special senses, nervous system, endocrine system, family planning devices and pregnancy diagnosis tests, demonstration of general neurological examination, function of olfactory nerve, visual acuity, reflex activity, positive and negative feedback mechanism.

Examination of different types of tastes, determination of tidal volume and vital capacity, recording of basal mass index and body temperature, demonstration of total blood count by cell analyser are also included

An exclusive and complete Practical Workbook for Bachelor in Pharmacy students

Krishna Garg MBBS, MS, PhD, FAMS, FIMSA, FASI

is ex-Professor and Head, Department of Anatomy, Lady Hardinge Medical College, New Delhi. She is the chief editor of BD Chaurasia's *Human Anatomy* (Vols 1-4); editor of BD Chaurasia's *Human Anatomy for Dental Students*, *Human Embryology*, *Handbook of General Anatomy* and BD Chaurasia's *Applied Anatomy and Physiology for BSc Nursing Students* and coauthor of *Textbook of Histology*, *Textbook of Neuroanatomy* and *Human Anatomy and Physiology for Diploma in Pharmacy Students*.

Medha Joshi MBBS, FCGP

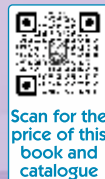
is visiting faculty, Department of Anatomy, Pt Deendayal Upadhyaya National Institute for Persons with Physical Disabilities, and Amar Jyoti Institute of Physiotherapy, Delhi. She had taught anatomy to dental students at Krishna Dental College and Harsaran Das Dental College, Ghaziabad, and is an examiner of Delhi University. She has a keen interest in the subject of anatomy and her experience as a general physician of 25 years provided her insight in formulating the Clinical Anatomy sections of this book.

Sudipta Kundu MSc, PhD

is currently Associate Professor and Head, Department of Physiology, Kalka Dental College, Meerut. He completed his BSc (Hons) from Kolkata University and MSc (Physiology) from Presidency College, Kolkata, and PhD from Burdwan University, West Bengal. With a teaching experience of 15 years, he has been teaching physiology to BPharm, BSc (Nursing), BDS and MDS students. He has attended conferences, presented and published scientific papers, and is extremely popular in the student community.



CBS Publishers & Distributors Pvt Ltd
4819/XI, Prahlad Street, 24 Ansari Road, Daryaganj, New Delhi 110 002, India
E-mail: delhi@cbspd.com, customercare@cbspd.com; Website: www.cbspd.com
New Delhi | Bengaluru | Chennai | Kochi | Kolkata | Lucknow | Mumbai
Hyderabad | Jharkhand | Nagpur | Patna | Pune | Uttarakhand



Human Anatomy and Physiology
Practical Workbook
for First and Second Semesters
Bachelor in Pharmacy

Garg | Joshi | Kundu



Human Anatomy and Physiology

Practical Workbook

Course Codes: BP107P and BP207P

for First and Second Semesters Bachelor in Pharmacy

As per the latest syllabus prescribed by Pharmacy Council of India

Krishna Garg
Medha Joshi
Sudipta Kundu



CBSPD Dedicated to Education

CBS Publishers & Distributors Pvt Ltd

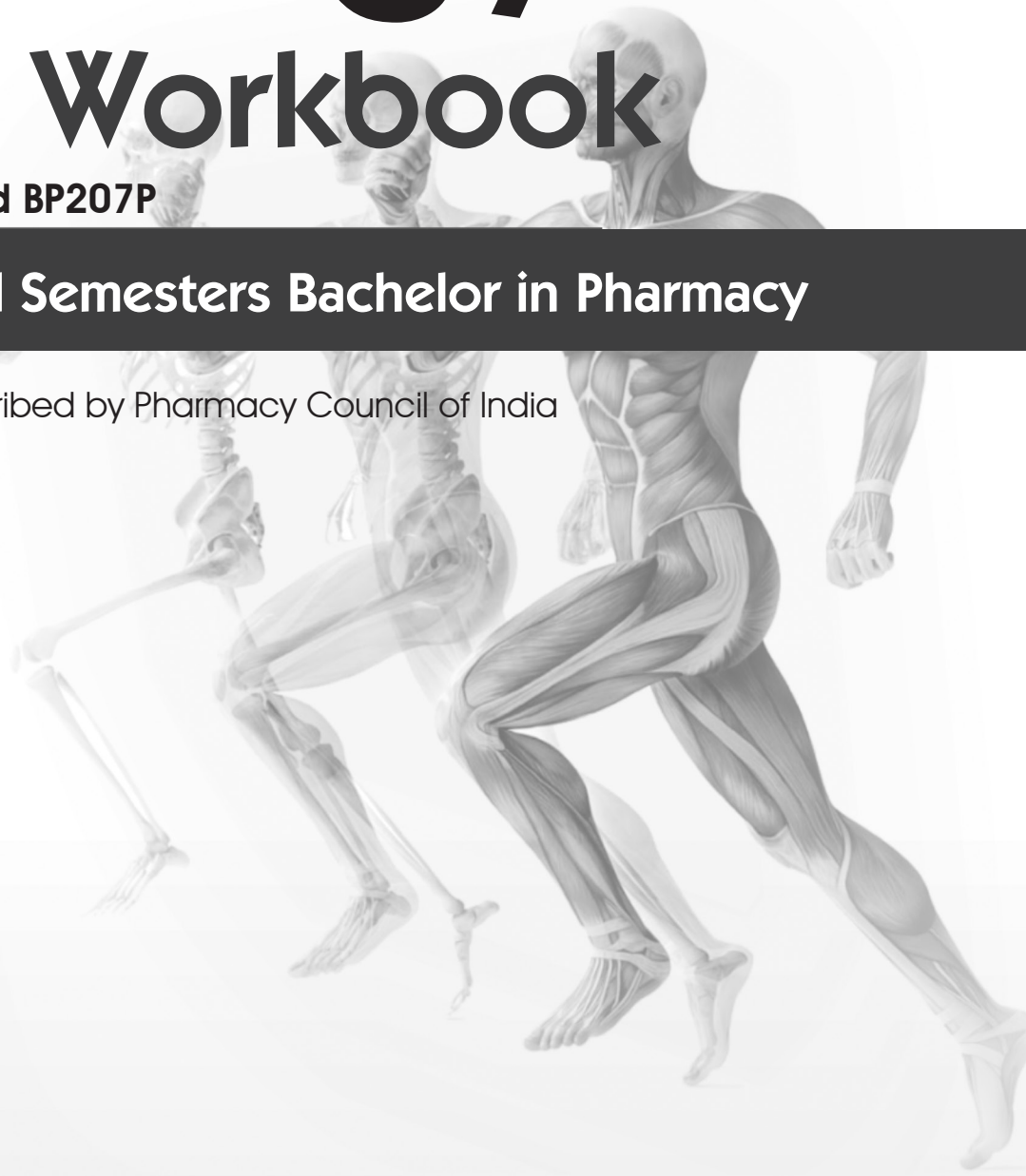


Human Anatomy and Physiology Practical Workbook

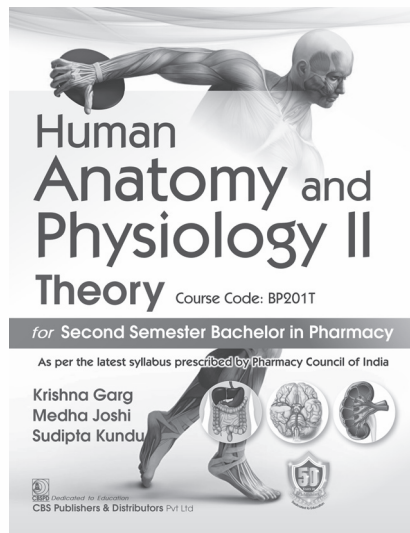
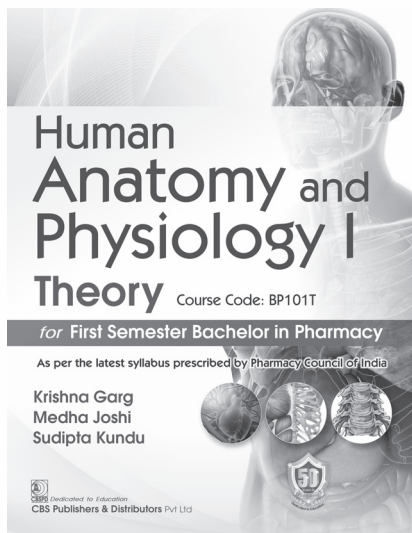
Course Codes: BP107P and BP207P

for First and Second Semesters Bachelor in Pharmacy

As per the latest syllabus prescribed by Pharmacy Council of India



Related Publications



Other Titles Authored/Edited by Dr Krishna Garg

1. *BD Chaurasia's Human Anatomy*, 9th Edition [Volumes 1–4]
2. *BD Chaurasia's Handbook of General Anatomy*, 6th Edition
3. *BD Chaurasia's Human Anatomy for Dental Students*, 4th Edition
4. *Manual of Human Anatomy Dissection*
5. *Practical Anatomy Workbook*, 3rd Edition
6. *Human Anatomy and Physiology : Theory and Practical for Diploma in Pharmacy Students*, 2nd Edition
7. *Practical Histology Workbook*, 2nd Edition
8. *BD Chaurasia's Human Embryology*, 2nd Edition
9. *Textbook of Histology*, 5th Edition
10. *Textbook of Neuroanatomy with Clinical Orientation*, 6th Edition
11. *Anatomy and Physiology for Nursing and Allied Health Sciences*
12. *Anatomy and Physiology for GNM Students*
13. *Anatomy and Physiology for BSc Nursing Students*
14. *Anatomy and Physiology for Nursing (Hindi)*
15. *Anatomy and Physiology for Allied Health Sciences (Hindi)*
16. *Companion Pocketbook BD Chaurasia's Human Anatomy [Volumes 1–3]*

Human Anatomy and Physiology Practical Workbook

Course Codes: BP107P and BP207P

for First and Second Semesters Bachelor in Pharmacy

As per the latest syllabus prescribed by Pharmacy Council of India

Krishna Garg

MBBS MS PhD FAMS FASI, Legend of Anatomy
Ex-Professor and Head
Department of Anatomy
Lady Hardinge Medical College, New Delhi

Medha Joshi

MBBS FCGP
Guest Faculty
Pt Deendayal Upadhyaya National Institute for
Persons with Physical Disabilities, New Delhi, and
Amar Jyoti Institute of Physiotherapy, Delhi

Sudipta Kundu

MSc PhD
Associate Professor and Head
Department of Physiology
Kalka Dental College
Meerut, UP



CBS Publishers & Distributors Pvt Ltd

New Delhi • Bengaluru • Chennai • Kochi • Kolkata • Lucknow • Mumbai
Hyderabad • Jharkhand • Nagpur • Patna • Pune • Uttarakhand

Disclaimer

Science and technology are constantly changing fields. New research and experience broaden the scope of information and knowledge. The authors have tried their best in giving information available to them while preparing the material for this book. Although all efforts have been made to ensure optimum accuracy of the material, yet it is quite possible some errors might have been left uncorrected. The publisher, the printer and the authors will not be held responsible for any inadvertent errors or inaccuracies.

Human Anatomy and Physiology

Practical workbook

Course Codes: BP107P and BP207P

for First and Second Semesters Bachelor in Pharmacy

As per the latest syllabus prescribed by Pharmacy Council of India

ISBN: 978-93-5466-519-6

Copyright © Authors and Publisher

First Edition: 2023

All rights reserved. No part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or any information storage and retrieval system without permission, in written, from the authors and the publisher.

Published by Satish Kumar Jain and produced by Varun Jain for

CBS Publishers & Distributors Pvt Ltd

4819/XI Prahlad Street, 24 Ansari Road, Daryaganj, New Delhi 110 002, India.

Ph: 011-23289259, 23266861, 23266867

Fax: 011-23243014

Website: www.cbspd.com

e-mail: delhi@cbspd.com

Corporate Office: 204 FIE, Industrial Area, Patparganj, Delhi 110 092, India

Ph: 011-4934 4934

Fax: 011-4934 4935

e-mail: publishing@cbspd.com; publicity@cbspd.com

Branches

- **Bengaluru:** Seema House 2975, 17th Cross, K.R. Road, Banasankari 2nd Stage, Bengaluru 560 070, Karnataka, India

Ph: +91-80-26771678/79

Fax: +91-80-26771680

e-mail: bangalore@cbspd.com

- **Chennai:** 7, Subbaraya Street, Shenoy Nagar, Chennai 600 030, Tamil Nadu, India

Ph: +91-44-26680620, 26681266

Fax: +91-44-42032115

e-mail: chennai@cbspd.com

- **Kochi:** 42/1325, 36, Power House Road, Opposite KSEB, Ernakulam 682 018 Kochi, Kerala, India

Ph: +91-484-4059061-67

Fax: +91-484-4059065

e-mail: kochi@cbspd.com

- **Kolkata:** 147, Hind Ceramics Compound, 1st Floor, Nilgunj Road, Belghoria, Kolkata 700 056, West Bengal, India

Ph: +91-33-25633055/56

e-mail: kolkata@cbspd.com

- **Lucknow:** Basement, Khushnuma Complex, 7-Meerabai Marg (Behind Jawahar Bhawan), Lucknow-226 001, Uttar Pradesh, India

Ph: +910522-4000032

e-mail: tiwari.lucknow@cbspd.com

- **Mumbai:** PWD Shed, Gala No. 25/26, Ramchandra Bhatt Marg, Next to JJ Hospital Gate No. 2, Opp Union Bank of India, Noorbaug, Mumbai-400009, Maharashtra, India

Ph: +91-22-66661880/89

e-mail: mumbai@cbspd.com

Representatives

• **Hyderabad** 0-9885175004

• **Jharkhand** 0-9811541605

• **Nagpur** 0-9421945513

• **Patna** 0-9334159340

• **Pune** 0-9623451994

• **Uttarakhand** 0-9716462459

Printed at: Goyal Offset Works Pvt. Ltd., Haryana India

Preface

I hear, I imagine; I see, I remember; I do, I understand

The above quotation rightly applies to this book, i.e. one only understands fully after manually doing any job. A practical workbook is essential for learning the various facets of pharmacy theory. It also teaches one to understand the mechanisms occurring in any organ system of the human body.

This Practical Workbook guides the students to complete physiology practicals manually with the help of various pieces of laboratory equipment. For the practical part of anatomy, many diagrams are given in detail as per the syllabus requirements. These illustrations have to be understood with the help of the theoretical information provided in the source books:

Human Anatomy and Physiology I: Theory for First Semester Bachelor in Pharmacy (ISBN 9789354661976)

Human Anatomy and Physiology II: Theory for Second Semester Bachelor in Pharmacy (ISBN 9789354661228)

Written by us and published under the same banner CBS Publishers & Distributors. After that various parts have to be labelled in the diagrams to get a full grasp of the topics concerned.

As we are aware of 'theoretical learning' and 'practical performance' are the two sides of a coin. While studying human anatomy and physiology, theory and practical go hand in hand and complement each other thoroughly. This great combination helps us to learn, recapitulate for the various examinations during the study period and later on during the professional career. To do the practicals sensibly, the above mentioned books have to be studied thoroughly and referred to repeatedly to get in-depth knowledge of the topics and to clear any doubt in the mind.

First part of the book is related to Semester I (Course Code BP107P) and the second part to Semester II (Course Code BP207P) human anatomy and physiology for Bachelor in Pharmacy students. The results of the practicals have to be recorded at the end of each chapter and in the lines under the heading of 'observation exercise'. A few additional blank pages have been given for extra recordings.

The laboratories in the institutions teaching bachelor in pharmacy courses are expected to have • articulated skeletons, • loose set of bones, • histological stained slides of various tissues, • charts and • models of all systems, and • proper equipment for manually performing the physiology practicals in small groups under expert guidance. This will ensure ideal learning for the students and will go a long way in the betterment of their careers.

Acknowledgements

We are grateful to the Almighty for His guidance during the preparation of the text and illustrations of the *Practical Workbook of Human Anatomy and Physiology for Bachelor in Pharmacy*.

We extend our special thanks to Mr Satish Kumar Jain Chairman and Managing Director and Mr Varun Jain Director, CBS Publishers & Distributors Pvt Ltd, for their wholehearted support in publishing this book. The unquestionable support of Mr YN Arjuna Senior Vice President: Publishing, Editorial and Publicity, and his entire team comprising Ms Ritu Chawla GM—Production, Mr Manish Raj Graphic Artist, Ms Jyoti Sharma DTP Operator, Mr Neeraj Sharma Copyeditor and Mr Neeraj Prasad Graphic Artist is really appreciable. They have all done an excellent work to bring out the first edition of the book with appreciable quality. We are really obliged to all of them and pray for their prosperity.

**Krishna Garg
Medha Joshi
Sudipta Kundu**

Syllabus

Human Anatomy and Physiology (Practical)

Course Code BP107T

(4 Hours/week)

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.

1. Study of compound microscope.
2. Microscopic study of epithelial and connective tissue
3. Microscopic study of muscular and nervous tissue
4. Identification of axial bones
5. Identification of appendicular bones
6. Introduction to hemocytometry.
7. Enumeration of white blood cell (WBC) count
8. Enumeration of total red blood corpuscles (RBC) count
9. Determination of bleeding time
10. Determination of clotting time
11. Estimation of hemoglobin content
12. Determination of blood group.
13. Determination of erythrocyte sedimentation rate (ESR).
14. Determination of heart rate and pulse rate.
15. Recording of blood pressure.

Course Code BP207T

(4 Hours/week)

1. To study the integumentary and special senses using specimen, models, etc.,
2. To study the nervous system using specimen, models, etc.,
3. To study the endocrine system using specimen, models, etc
4. To demonstrate the general neurological examination
5. To demonstrate the function of olfactory nerve
6. To examine the different types of taste.
7. To demonstrate the visual acuity
8. To demonstrate the reflex activity
9. Recording of body temperature
10. To demonstrate positive and negative feedback mechanism.
11. Determination of tidal volume and vital capacity.
12. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens.
13. Recording of basal mass index .
14. Study of family planning devices and pregnancy diagnosis test.
15. Demonstration of total blood count by cell analyser
16. Permanent slides of vital organs and gonads.

Certificate

Student's Name: _____

Class: _____ Roll No. _____

Subject: _____

This is to certify that experiments, written in the index, have been performed by the student, are satisfactory.

Grade _____

Name and signature of lab in-charge

College stamp



Date _____

Certificate

Student's Name: _____

Class: _____ Roll No. _____

Subject: _____

This is to certify that experiments, written in the index, have been performed by the student, are satisfactory.

Grade _____

Name and signature of lab in-charge

College stamp



Date _____

Contents

<i>Preface</i>	v
<i>Syllabus</i>	vi

Semester I

1. Compound Microscope	1
2. Microscopic Study of Epithelial and Connective Tissues	4
3. Microscopic Study of Muscular and Nervous Tissues	11
4. Identification of Axial Bones	16
5. Identification of Appendicular Bones	20
6. Introduction to Hemocytometry	23
7. Enumeration of White Blood Cell Count	25
8. Enumeration of Total RBC Count	31
9. Determination of Bleeding Time	35
10. Determination of Clotting Time	37
11. Estimation of Haemoglobin Concentration	39
12. Determination of Blood Group	42
13. Determination of ESR	44
14. Determination of Heart Rate and Pulse Rate	47
15. Recording of Blood Pressure	50

Semester II

1. Integumentary and Special Senses	55
2. Nervous System	61
3. Endocrine System	69
4. Demonstration of General Neurological Examination and Cranial Nerves	75
5. Demonstration of the Function of Olfactory Nerve	80
6. Examination of the Different Types of Taste	82
7. Demonstration of the Visual Acuity	84
8. Demonstration of Reflex Activity	87
9. Recording of Body Temperature	91
10. Demonstration of Positive and Negative Feedback Mechanism Experiments	94
11. Determination of Tidal Volume and Vital Capacity	96
12. Systems of the Body	98
13. Recording of Body Mass Index	113
14. Study of Family Planning Devices and Pregnancy Diagnosis Test	115
15. Demonstration of Total Blood Count by Cell Analyzer	118
16. Permanent Slides of Vital Organs and Gonads	120

