Human Anatomy and Physiology

Second Edition

Theory and Practical

Course Codes ER20-14T and ER20-14P

For Diploma in Pharmacy Students

has been written in a simple and concise language, specifically aiming the text at the students of diploma in pharmacy. The text has been well supplemented by a large number of easily reproducible diagrams thoroughly explaining the subject topics and also providing a photogenic memory to the reader. In addition, tables and flowcharts have been introduced for comprehensive, all-round and complete understanding of the theoretical aspects and practical applications.

Salient features

- The text has been written as per the latest syllabus prescribed by Pharmacy Council of India.
- Theory section has been written as per new Course Code ER 20-14T
- Practical section has been written as per new course code ER20-14P
- At the end of each chapter in theory section, Points to Remember are given as the highlights of the chapter. Multiple Choice Questions (MCQs) are also given with their answers to supplement the knowledge of the students.

Discussion on the clinical aspects provides a 'bird's eyeview' of many important topics which pharmacy students would anticipate and may see during their training period. Most importantly, the book includes the section on practicals of both anatomy and physiology making it a comprehensive textbook on the two important subjects.

This is a complete textbook written by subject experts catering to the theory and practical requirements of diploma 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* (hybrid edition); and coauthor of *Textbook of Histology* and *Textbook of Neuroanatomy*.

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.

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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 11 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.

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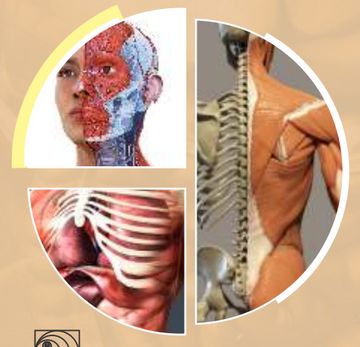

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Disclaimer

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Preface to the Second Edition

Human Anatomy and Physiology: Theory and Practical for Diploma in Pharmacy Students has been designed as per Course Codes: ER20-14T and ER20-14P, according to the latest syllabus prescribed by Pharmacy Council of India under Regulation 7 of the Education Regulations, 2020, for Diploma in Pharmacy course, implemented with strict compliance from 2021–2022 academic session. The best part of the book is that it contains both theoretical and practical aspects of anatomy and physiology for pharmacy course making it a "two-in-one" book.

Students these days are quite enthusiastic about taking up a career in pharmacy with the result that many of them are opting for it as a subject of their choice.

The language of the book is lucid and simple. The text has been covered in 15 chapters, providing necessary and adequate knowledge of both anatomy and physiology. At the end of each chapter, *Points to remember* are given which form the "must know" component of the concerned chapter. To evaluate the knowledge and skill acquired, examination-oriented multiple choice questions are given with their respective answers.

The practicals on anatomy encompass the skeleton and various systems. Students have to identify the various parts and enumerate their functions. The last chapter of anatomy practical is on histology of the basic tissues. One can see the histological slides under the microscope and identify various components of the tissue. Physiology practicals include study of microscope, determination of various parameters of blood, recording of body temperature, pulse, heart rate, blood pressure and electrocardiogram. The practical component of both the subjects has been supplemented by eight coloured plates.

Diploma in pharmacy is a "stepping stone" for bachelor's and master's courses in pharmacy or setting up a chemist's shop. As is well known, higher studies are an unending lifelong learning.

We are grateful to Mr SK Jain, CMD, and Mr Varun Jain, Director, CBS Publishers & Distributors, for all the possible help.

Constant and continuous support of Mr YN Arjuna, Senior Vice President Publishing, Editorial and Publicity); Mrs Ritu Chawla, GM Production; Mr Sanju, Graphic Designer; Mrs Sunita Rautela, DTP Operator; and Mr Kshirod Sahoo, Proofreader; is deeply appreciated. Impetus provided by Mr Dignesh Vashist is also welcome.

The feedback about the book may please be sent to dr.krishnagarg@gmail.com

happy reading

Krishna Garg
Medha Joshi
Sudipta Kundu

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The feedback about the book may please be sent to dr.krishnagarg@gmail.com

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Contents

PRACTICAL PART

Syllabus

HUMAN ANATOMY AND PHYSIOLOGY – THEORY

Course Code: ER20-14T **Theory 75 hours (3 Hours/week)**

Scope: This course is designed to impart basic knowledge on the structure and functions of the human body. It helps in understanding both homeostasis mechanisms and homeostatic imbalances of various systems of the human body.

Course Objectives: This course will discuss the following:

1.Structure and functions of the various organ systems and organs of the human body

2.Homeostatic mechanisms and their imbalances in the human body

3.Various vital physiological parameters of the human body and their significances

Course Outcomes: Upon successful completion of this course, the students will be able to

1.Describe the various organ systems of the human body

2.Discuss the anatomical features of the important human organs and tissues

3.Explain the homeostatic mechanisms regulating the normal physiology in the human system

4.Discuss the significance of various vital physiological parameters of the human body

Chapter	Topic	Hours
1	Scope of Anatomy and Physiology Definition of various terminologies	2
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3	**Tissues of the human body:** Epithelial, Connective, Muscular and Nervous tissues—their sub-types and characteristics	4
4	**Osseous system:** structure and functions of bones of axial and appendicular skeleton Classification, types and movements of joints, disorders of joints	3 3
5	**Haemopoietic system** • Composition and functions of blood • Process of Hemopoiesis • Characteristics and functions of RBCs, WBCs, and platelets • Mechanism of Blood Clotting • Importance of Blood groups	8

Contd...

Chapter	Topic	Hours
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7	**Cardiovascular system** • Anatomy and Physiology of heart • Blood vessels and circulation (Pulmonary, coronary and systemic circulation) • Cardiac cycle and Heart sounds, Basics of ECG • Blood pressure and its regulation	8
8	**Respiratory system** • Anatomy of respiratory organs and their functions • Regulation, and Mechanism of respiration • Respiratory volumes and capacities–definitions	4
9	**Digestive system** • Anatomy and Physiology of the GIT • Anatomy and functions of accessory glands • Physiology of digestion and absorption	8
10	**Skeletal muscles** • Histology • Physiology of muscle contraction • Disorder of skeletal muscles	2
11	**Nervous system** • Classification of nervous system • Anatomy and physiology of cerebrum, cerebellum, mid brain • Function of hypothalamus, medulla oblongata and basal ganglia • Spinal cord-structure and reflexes • Names and functions of cranial nerves. • Anatomy and physiology of sympathetic and parasympathetic nervous system (ANS)	8
12	**Sense organs: Anatomy and physiology of** • Eye • Ear • Skin • Tongue • Nose	6
13	**Urinary system** • Anatomy and physiology of urinary system • Physiology of urine formation • Renin–angiotensin system • Clearance tests and micturition	4

Contd...

Chapter	Topic	Hours
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15	**Reproductive system** • Anatomy of male and female reproductive system • Physiology of menstruation • Spermatogenesis and Oogenesis • Pregnancy and parturition	4

HUMAN ANATOMY AND PHYSIOLOGY – PRACTICAL

Course Code: ER20-14P **Practical 75 hours (3 Hours/week)**

Scope: This course is designed to train the students and instil the skills for carrying out basic physiological monitoring of various systems and functions.

Course Objectives: This course will provide hands-on experience in the following:

1. General blood collection techniques and carrying out various haematological assessments and interpreting the results
2. Recording and monitoring the vital physiological parameters in human subjects and the basic interpretations of the results
3. Microscopic examinations of the various tissues permanently mounted in glass slides
4. Discuss the anatomical and physiological characteristics of various organ systems of the body using models, charts, and other teaching aids

Course Outcomes: Upon successful completion of this course, the students will be able to

1. Perform the haematological tests in human subjects and interpret the results
2. Record, monitor and document the vital physiological parameters of human subjects and interpret the results
3. Describe the anatomical features of the important human tissues under the microscopical conditions
4. Discuss the significance of various anatomical and physiological characteristics of the human body

Practicals

1. Study of compound microscope
2. General techniques for the collection of blood
3. Microscopic examination of Epithelial tissue, Cardiac muscle, Smooth muscle, Skeletal muscle, Connective tissue, and Nervous tissue of ready/pre-prepared slides.
4. Study of Human Skeleton-Axial skeleton and appendicular skeleton

5. Determination of
   a. Blood group
   b. ESR
   c. Haemoglobin content of blood
   d. Bleeding time and clotting time
6. Determination of WBC count of blood
7. Determination of RBC count of blood
8. Determination of Differential count of blood
9. Recording of Blood Pressure in various postures, different arms, before and after exertion and interpreting the results
10. Recording of Body temperature (using mercury, digital and IR thermometers at various locations), Pulse rate/Heart rate (at various locations in the body, before and after exertion), Respiratory Rate
11. Recording Pulse Oxygen (before and after exertion)
12. Recording force of air expelled using Peak Flow Meter
13. Measurement of height, weight, and BMI
14. Study of various systems and organs with the help of chart, models, and specimens
    a. Cardiovascular system
    b. Respiratory system
    c. Digestive system
    d. Urinary system
    e. Endocrine system
    f. Reproductive system
    g. Nervous system
    h. Eye
    i. Ear
    j. Skin