

TEXTBOOK OF HUMAN ANATOMY & PHYSIOLOGY

For Diploma in Pharmacy First Year

Education Regulation 2020 (New PCI Syllabus)

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We are thankful to Dr. Sonia Bajaj, Assistant Professor in Faculty of Zoology at Shri Shankaracharya Mahavidyalaya, Juwani road, Bhilai for the Hindi translation of this book. She completed her M.Sc. (Zoology) in the year 1999 from Government Science college Durg, Chhattisgarh, Ph.D. (Zoology) in the year 2003 from Pt. RaviShankar Shukla University Raipur, Chhattisgarh, India,. She has 14 years of teaching experience. She is a PhD. Guide (Zoology) from Hemchand Yadav University, Durg. She has completed one UGC sponsored Minor project and organised several National and International Seminar and Conferences. In addition, she is a life time member of Global Academic Society. She has several awards in her credits. She has published various research papers in reputed journals and published 02 book and 01 book chapter to her credits. Her area of interest is in the field of Ichthyology, Biodiversity and Physiology

Preface

The textbook of Human Anatomy and Physiology has been written for students of diploma in pharmacy first-year students keeping in mind specific requirements of the Pharmacy Council of India (PCI), Education Regulation - 2020. This is a bilingual book in both English and Hindi for easy understanding to students. This book is covering the entire syllabus as per new PCI norms including practicals and previous year question papers.

This book containing fifteen chapters with scope of anatomy and physiology. These chapters are preceded with introduction of different organs of the human body. Further, chapters containing structure, characteristics and functioning of different organ systems in our body.

I would like to acknowledge the invaluable contributions provided by the Probocell Press editorial team. I give great thanks to the graphic designers who were instrumental in preparing much of the artwork for this text. I would also like to acknowledge my colleagues and students for their willingness to serve as test subjects for many of the useful contents in this book. Finally, I would like to thank my teachers and parents for their guidance, support, and encouragement throughout the process of completing this book.

“So long as you do not achieve social liberty, whatever freedom is provided by the law is of no avail to you.”
— B.R. Ambedkar

We expect to bring out new editions in the coming years. Suggestions to improve the content are welcome from the teachers and students.

Raipur
18 September 2021

Ritika Singh
Vivek Sachan
Sachin Kumar Agrahari
Shravan Kumar Paswan
Preeti Lal

Contents

Chapter	Topics
1	Scope of Anatomy and Physiology <ul style="list-style-type: none">• Definition of various terminologies
2	Structure of Cell: Components and its functions
3	Elementary tissues of the human body: Epithelial, Connective, Muscular and Nervous tissues – their sub-types and characteristics
4	Osseous system: Structure and functions of bones of axial and appendicular skeleton Classification, types and movements of joints, disorders of joints
5	Haemopoietic system <ul style="list-style-type: none">• Composition and functions of blood• Process of Hemopoiesis• Characteristics and functions of RBCs, WBCs and platelets• Mechanism of Blood Clotting• Importance of Blood groups
6	Lymphatic system <ul style="list-style-type: none">• Lymph and lymphatic system, composition, function and its formation• Structure and functions of spleen and lymph node
7	Cardiovascular system <ul style="list-style-type: none">• 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	Respiratory system <ul style="list-style-type: none">• Anatomy of respiratory organs and their functions.• Regulation Mechanism of respiration• Respiratory volumes and capacities – definitions
9	Digestive system <ul style="list-style-type: none">• Anatomy and Physiology of GIT• Anatomy and functions of accessory glands• Physiology of digestion and absorption

<p>10</p>	<p>Skeletal muscles</p> <ul style="list-style-type: none"> • Histology • Physiology of muscle contraction • Disorder of skeletal muscles
<p>11</p>	<p>Central nervous system and its functions</p> <ul style="list-style-type: none"> • 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)
<p>12</p>	<p>Sense organs - Anatomy and physiology of</p> <ul style="list-style-type: none"> • Eye • Ear • Skin • Tongue • Nose
<p>13</p>	<p>Urinary system</p> <ul style="list-style-type: none"> • Anatomy and physiology of urinary system • Physiology of urine formation • Renin - angiotensin system • Clearance tests and micturition
<p>14</p>	<p>Endocrine system (Hormones and their functions)</p> <ul style="list-style-type: none"> • Pituitary gland • Adrenal gland • Thyroid and parathyroid gland • Pancreas and gonads
<p>15</p>	<p>Reproductive system</p> <ul style="list-style-type: none"> • Anatomy of male and female reproductive system • Physiology of menstruation • Spermatogenesis and Oogenesis • Pregnancy and parturition

Experiments

Experiment no.	Title
1	To study the different parts of a compound microscope and its general techniques
2	Microscopic study of epithelial and connective tissue
3	Microscopic study of muscular and nervous tissue
4	To study the recording of blood pressure
5	To determine the bleeding time of own blood by Duke's method
6	To examine different types of taste
7	To study the nervous system using specimens, models, etc.
8	To record body temperature
9	To study hemocytometer with the help of a hemocytometer kit
10	To determine WBC count in a given blood sample
11	To determine total blood corpuscles in a given blood sample
12	To identify the clotting time of your sample
13	To estimate the hemoglobin content of your blood sample
14	To detect the blood group of your blood sample
15	To determine erythrocyte sedimentation rate (ESR)
16	To determine heat rate and pulse rate
17	To study the human digestive system with the help of a chart and model
18	To study the respiratory system with the help of a chart and model
19	To study the cardiovascular system with the help of a chart and model
20	To study the urinary system with the help of a chart and model
21	To study the male and female reproductive system with the help of chart and model

CHAPTER 1

SCOPE OF ANATOMY AND PHYSIOLOGY

Introduction

Anatomy is the science that deals with structures of the body and the relationship of various parts to each other. Knowledge of these structures is necessary to understand their functions.

परिचय

एनाटॉमी वह विज्ञान है जो शरीर की संरचनाओं और विभिन्न भागों के एक दूसरे से संबंध से संबंधित है। इनके कार्यों को समझने के लिए इन संरचनाओं का ज्ञान आवश्यक है

The subject matter of anatomy includes:

- Cytology – Study of cells
- Histology – Study of tissues
- Osteology – Study of bones
- Myology – Study of muscles
- Athrology – Study of joints
- Splanchnology – Study of organs
- Neurology – Study of nervous Systems

शरीर रचना विज्ञान के विषय में शामिल हैं:

- कोशिका विज्ञान - कोशिकाओं का अध्ययन
- ऊतक विज्ञान - ऊतकों का अध्ययन
- अस्थिविज्ञान - हड्डियों का अध्ययन
- मायोलॉजी - मांसपेशियों का अध्ययन
- आर्थ्रोलॉजी - जोड़ों का अध्ययन
- स्प्लेनोलाजी - अंगों का अध्ययन
- तंत्रिका विज्ञान - तंत्रिका तंत्र का अध्ययन

Descriptive terms used in Anatomy: Arrangement of various parts of the body may be:

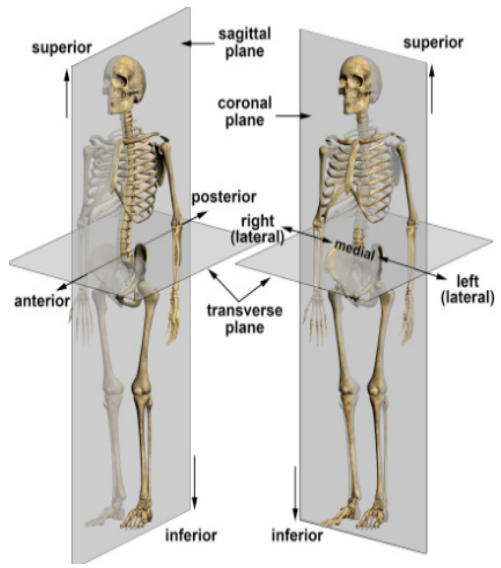
Symmetric: e.g., limbs, eyes, ear, and lungs. Their arrangement on the right side and left side are similar.

Asymmetric: e.g., Spleen and liver. The spleen lies entirely on the left side. The liver lies mostly on the right side.

The study of anatomy is done in anatomical positions, the body is erect, the head facing towards, arms by the sides and the palms of the hand facing towards. The following are few important terms that are used to describe the human body.

1. **Median Line (mid sagittal plane):** The central plane divides the body into two halves i.e. left and right.
2. **Median:** Nearer to the median line.
3. **Lateral:** Away from the median line.
4. **Superior:** Nearer to the head.
5. **Inferior:** Nearer to the foot.

6. **Anterior:** Nearer to the front surface of the body.
7. **Posterior:** Nearer to the back surface of the body.
8. **Proximal:** Nearer to the origin of the structure.
9. **Distal:** Away from the origin of the structure.
10. **Superficial:** Nearer to the skin surface.
11. **Deep:** Deeper from the skin surface.



शरीर रचना में प्रयुक्त वर्णनात्मक शब्द: शरीर के विभिन्न भागों की व्यवस्था हो सकती है:
सममित: जैसे, अंग, आंख, कान और फेफड़े। उनकी दायीं ओर और बायीं ओर की व्यवस्था समान है।

असममित: जैसे, प्लीहा और यकृत। तिल्ली पूरी तरह से बाईं ओर स्थित है। लीवर ज्यादातर दायीं तरफ होता है।

शरीर रचना विज्ञान का अध्ययन शारीरिक स्थितियों में किया जाता है, शरीर सीधा होता है, सिर की ओर, भुजाएँ भुजाएँ और हाथ की हथेलियाँ सामने की ओर होती हैं। निम्नलिखित कुछ महत्वपूर्ण शब्द हैं जिनका उपयोग मानव शरीर का वर्णन करने के लिए किया जाता है।

1. **मध्य रेखा (मध्य धनु तल):** केंद्रीय तल शरीर को दो हिस्सों में विभाजित करता है अर्थात बाएँ और दाएँ।
2. **माधिका:** माधिका रेखा के निकट।
3. **पार्श्व:** मध्य रेखा से दूर।
4. **सुपीरियर:** सिर के करीब।
5. **अवर:** पैर के करीब।
6. **पूर्वकाल:** शरीर के सामने की सतह के करीब।
7. **पश्च:** शरीर की पिछली सतह के निकट।
8. **समीपस्थ:** संरचना की उत्पत्ति के करीब।
9. **दूरस्थ:** संरचना की उत्पत्ति से दूर।
10. **सतही:** त्वचा की सतह के करीब।
11. **गहरा:** त्वचा की सतह से गहरा।

Movements at Joints: The following are few descriptive terms used to convey the movements which occur at various joints.

1. **Flexion:** A movement where similar surfaces come nearer to each other. This reduces the angles between two bones e.g. bending forearm at the elbow.
2. **Extension:** A movement where similar surfaces go apart. Here the angle between two bones is increased. It is the opposite of flexion i.e. straightening of the bent forearm.