

Human Anatomy, Physiology and Pathophysiology II (Practical)

BP208P

A Practical Record Book for B. Pharm Semester II

*As per the new Pharmacy Council of India (PCI) Syllabus
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Dr. Saurabh Saklani

Assistant Professor

School of Pharmacy & Emerging Sciences,
Baddi University of Emerging Sciences and
Technology, Himachal Pradesh, India

Anupama Kumari

Assistant Professor

School of Pharmacy & Emerging Sciences,
Baddi University of Emerging Sciences and
Technology, Himachal Pradesh, India

Shalini Sharma

Assistant Professor

School of Pharmacy & Emerging Sciences,
Baddi University of Emerging Sciences and
Technology, Himachal Pradesh, India

Asha Devi

Assistant Professor

School of Pharmacy & Emerging Sciences,
Baddi University of Emerging Sciences and
Technology, Himachal Pradesh, India



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Preface

The practical course in Human Anatomy, Physiology and Pathophysiology II is where the second-semester student of pharmacy moves from the printed page to the model, the instrument, and the living subject. What the theory course describes in words-the structure of the nervous, respiratory, gastrointestinal, and reproductive systems, the working of the special senses, the measurement of simple physiological variables, and the reading of disease as altered function-this manual asks the student to see, to measure, and to record.

This book has been written as a record book. Each of the fifteen experiments prescribed in the syllabus is set out in the same order: aim, requirements, principle, a labelled diagram, procedure, observation tables, result, precautions, and viva questions. The principle and the procedure are given in full and point by point, so that the student comes to the bench prepared. The observation tables, the reading columns, the calculation boxes, and the result lines are printed blank, because they are the part of the practical that only the student can complete. A record book earns its value from the readings actually taken and entered in ink during the class.

The diagrams are drawn as clean line figures suitable for reproduction and for copying into the record. The viva questions at the end of each experiment, with their short answers, are meant for quick revision before the internal and external examinations. The reference values quoted throughout-body temperature, tidal volume, vital capacity, body mass index, visual acuity, and the rest-follow the standard textbooks of physiology.

It is hoped that this manual will help the student perform the minimum of twelve experiments required by the syllabus with understanding rather than by rote, and will serve as a lasting record of work done. Suggestions for its improvement are welcome.

Authors

Dr. Saurabh Saklani

Anupama Kumari

Shalini Sharma

Asha Devi

Course Objectives

The objectives of this course are to:

1. Provide foundational knowledge of the structure and functions of major organ systems of the human body.
2. Develop understanding of physiological mechanisms responsible for maintenance of homeostasis.
3. Explain the pathophysiology of diseases affecting different organ systems.
4. Explore causes of diseases and the body's responses to pathological conditions.
5. Build a strong base for clinical learning through the study of functional and structural changes in disease states.

Course Outcomes

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

1. Explain the gross morphology, structures, and functions of various organs and organ systems of the human body.
2. Demonstrate basic emergency response procedures such as cardiopulmonary resuscitation (CPR).
3. Describe the etiology and pathogenesis of selected disease states.
4. Identify signs and symptoms, risk factors, diagnostic methods, prevention, treatment strategies, and complications of diseases.
5. Understand coordinated working patterns of different organs of each system and perform experiments related to special senses and the nervous system.

Syllabus

Unit	Topics	No. of lectures
	(Minimum of 12 experiments must be performed) 1. Study of nervous system using specimens and models. 2. Study of respiratory system using models. 3. Study of gastrointestinal system using models. 4. Study of reproductive system using models. 5. Demonstration of general neurological examination. 6. Demonstration of function of olfactory nerve. 7. Examination of different types of taste. 8. Demonstration of visual acuity. 9. Demonstration of reflex activity. 10. Recording of body temperature. 11. Determination of tidal volume and vital capacity. 12. Recording of body mass index (BMI). 13. Study of family planning devices and pregnancy diagnosis tests. 14. Understanding pathophysiology of IBD, peptic ulcer, jaundice, hepatitis, typhoid, asthma, tuberculosis, diabetes, and thyroid disorders through case files / case reports. 15. Hands-on training in cardiopulmonary resuscitation (CPR).	45 Hours

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General Laboratory Instructions

Human Anatomy, Physiology and Pathophysiology II (Practical) is the applied companion to the theory course. The practicals let the student verify, with the hand and the eye, what the lectures describe in words: the gross structure of the major organ systems, the working of the special senses and the nervous system, the measurement of simple physiological variables, and the reading of disease as a set of altered functions. The following instructions apply to every session in this manual and should be read once, carefully, before the first experiment.

Conduct in the laboratory

- Reach the laboratory on time and occupy the allotted place; do not move models or charts between benches without permission.
- Wear a clean, buttoned apron and keep long hair tied back.
- Keep the working bench clear except for the record book, the pen, and the apparatus in use for the current experiment.
- Handle anatomical models, specimens, and charts gently; they are shared teaching aids and are easily damaged.
- Maintain silence and discipline; physiological readings on a subject are spoiled by noise and disturbance.
- Do not eat, drink, or apply cosmetics in the laboratory.
- Report any breakage, injury, or spillage to the teacher at once.

Working with a human subject

- Several experiments (neurological examination, taste, smell, visual acuity, reflexes, temperature, vital capacity, BMI, CPR on a manikin) use a fellow student as the subject or the operator.
- Take the subject's consent, explain the procedure in simple language, and stop if the subject is uncomfortable.
- Never share mouthpieces, spirometer tubes, or thermometers between subjects without disinfection.
- CPR is always practised on the training manikin, never on a live person.

Keeping the record book

- Enter the date and the experiment number at the top of every practical.
- Write the aim, requirements, principle, and procedure before the class where possible.
- Record every reading directly into the observation table in ink, at the moment it is taken; do not copy from a rough sheet afterwards.
- Do not leave an observation blank because a reading looks wrong; note it and comment in the result.
- Draw diagrams in pencil, label fully, and give every figure a number and a title.
- Complete the result and inference, get the record signed by the teacher, and keep the book for internal and external assessment.

How each experiment in this manual is set out

Every experiment follows the same order so that nothing is missed:

1. **Aim**-the single objective of the practical.
2. **Requirements**-the models, apparatus, and materials needed.
3. **Principle / Theory**-the anatomy or physiology behind the experiment, in points.
4. **Diagram**-a labelled figure to draw and study.
5. **Procedure**-the numbered steps to perform.
6. **Observations**-tables printed **blank**, to be filled during the session.
7. **Result / Inference**-the conclusion, to be written by the student.
8. **Precautions**-the points that keep the reading correct and the subject safe.
9. **Viva Voce**-questions with short answers for revision and the oral examination.

A note on the blank tables

Throughout this book the observation tables, reading columns, calculation boxes, and result lines are deliberately left empty. They are the part of the practical the student must complete. The printed theory, procedure, and diagrams are the scaffold; the readings and inferences the student enters turn the scaffold into a finished record of work actually done. This is what an examiner looks for.

Experiment 1- Study of the Nervous System using Specimens and Models

Aim

To study the gross structure of the human nervous system with the help of specimens, models, and charts, and to identify its major parts and their functions.

Requirements

- Model of the human brain (sagittal and whole).
- Model or chart of the spinal cord and a cross-section of the spinal cord.
- Model of a neuron.
- Chart of the autonomic nervous system and the reflex arc.
- Preserved specimens where available.
- Pointer, hand lens, record book, and pencil.

Principle / Theory

- The nervous system is the master control and communication network of the body; it detects change, processes information, and drives a coordinated response.
- It is divided, on the basis of position, into two parts:
- **Central nervous system (CNS)**-the brain and the spinal cord; it integrates and commands.
- **Peripheral nervous system (PNS)**-the cranial and spinal nerves and ganglia; it carries information to and from the CNS.
- The functional unit is the **neuron**, which conducts electrical impulses. A neuron has a cell body (soma), branching **dendrites** that receive impulses, and a single **axon** that transmits them. Many axons are wrapped in a myelin sheath that speeds conduction.
- **Neuroglia** (glial cells) support, nourish, and insulate neurons but do not conduct impulses.
- The **brain** has four principal regions:
- **Cerebrum**-the largest part; its outer grey cortex governs voluntary movement, sensation, speech, memory, and reasoning. It is divided into frontal, parietal, temporal, and occipital lobes.
- **Cerebellum**-lies below and behind the cerebrum; it coordinates movement, posture, and balance.
- **Diencephalon**-contains the thalamus (a relay station for sensation) and the hypothalamus (control of temperature, hunger, thirst, and the endocrine system).
- **Brainstem**-the midbrain, pons, and medulla oblongata; it controls vital involuntary functions such as heart rate, breathing, and blood pressure.
- The **spinal cord** runs within the vertebral column from the medulla to about the first or second lumbar vertebra. In cross-section it shows central H-shaped grey matter (cell bodies) surrounded by white matter (ascending and descending tracts). It conducts impulses to and from the brain and is the centre for spinal reflexes.
- On the basis of function the PNS is divided into the **somatic** nervous system (voluntary control of skeletal muscle) and the **autonomic** nervous system (involuntary control of glands, smooth muscle, and cardiac muscle), the latter having **sympathetic** ("fight or flight") and **parasympathetic** ("rest and digest") divisions.