MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE SUMY STATE UNIVERSITY MEDICAL INSTITUTE Physiology and Pathophysiology Department with course of Medical Biology

# **PRACTICAL BOOK**

FOR PRACTICAL CLASSES ON PHYSIOLOGY

For students specializing 222 «Medicine» daily learning

STUDENT'S FULL NAME

<u>GROUP №</u>

Sumy

## <u>I semester</u>

Practical class #1

Date:

## THEME: "INTRODUCTION TO PHYSIOLOGY. OBJECT AND TASKS THE COURSE OF PHYSIOLOGY. METHODS OF PHYSIOLOGICAL RESEARCHES"

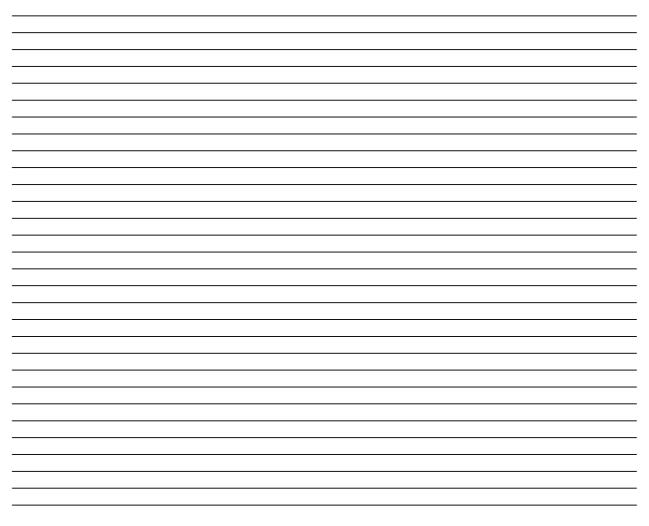
## Questions to the lesson:

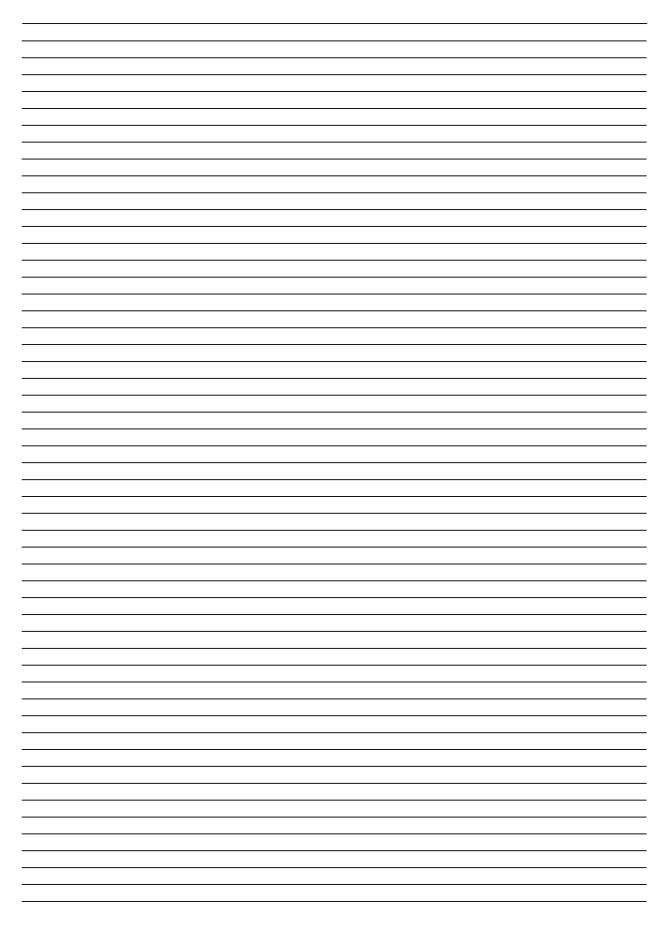
- 1. Physiology as a science. Connection with other disciplines.
- 2. Basic concepts of physiology: function, functional unit, physiological system, functional state of the organism.
- 3. Structural and functional organization of the human body. The concept of functions at different levels of living objects.
- 4. Elementary functions of cells.
- 5. Basic functional properties of the body as a whole. The structure features of cellular membrane, its functions, basic components.
- 6. Interrelation of an organism with the environment. A concept of irritants, irritations, biological reaction, excitability, excitative structures.
- 7. Methods of physiological studies.

## Literature:

Guyton, Arthur C. Textbook of medical physiology – Ch.2,4.

## INDIVIDUAL WORK "Basic stages of development of physiology as a science"





The teacher's signature\_\_\_\_\_

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## PRACTICAL CLASS #2

Date:

## THEME: "RESTING POTENTIAL OF NERVOUS AND MUSCULAR FIBRES"

#### **Questions** to the lesson:

- 1. Features of the structure of the cell membrane, the functions of its main components.
- 2. Differences of chemical composition of extracellular and intracellular fluids.
- 3. The passive transport of substances, its types and mechanisms (diffusion, osmosis).
- 4. The active transport of substances, its types and mechanisms (symporters and antiporters).
- 5. A concept of the membrane potential and resting potential. Methods of registration of resting potential and its physical characteristics.
- 6. The ionic mechanisms of origin of the normal resting membrane potential (diffusion potential, Nernst potential).
- 7. Resting membrane potential of nerves and skeletal muscle fibers. The main and additional factors, which influence on a value of the resting membrane potential.

## Literature:

Guyton, Arthur C. Textbook of medical physiology – Ch.4, 5.

## Practical work #1: "Preparation of a spinal frog"

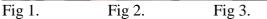
**Materials and equipments**: small and large scissors, anatomic tweezers, a scalpel, a probe, a tripod, cotton wool, physiological solution (Ringer's solution), dissection boards, wipes, a tray, an electrostimulator with electrodes, a research object - a frog.

To study muscles and nerves physiology of a frog, the frog must be killed but its tissues kept alive. This can be accomplished by destroying or pithing the frog's central nervous system. The frog is dead but its muscles and peripheral nerves will continue to function as long as their cells remain alive. Under the proper conditions, this state can be prolonged for several hours.

## **Procedure:**

- 1. Take the frog in the left hand.
- 2. Fix the head of the frog between the index and middle fingers, simultaneously fixing its hind legs.
- 3. Carry out decapitation, removing the upper jaw together with the brain at the level of the corners of the mouth (Fig. 1). The resulting preparation is called <u>a spinal frog</u>.
- 4. Fix the spinal frog`s lower jaw on the tripod.
- 5. Do the repeated mechanical irritation with tweezers' tip on the rear extremity of the decapitated frog, observe the reaction (Fig. 2).
- 6. Destroy the spinal cord of the frog with a probe (Fig. 3). Repeat mechanical stimulation.





#### **Results:**

- 1) What was observed when applying a mechanical irritation on the decapitated frog?
- 2) What was observed when applying a repeated mechanical irritation on the frog withdestructed spinal cord?

- 3) Draw the scheme
- of the experiment.1)

## 2) \_\_\_\_\_

3) The scheme of experiment:

#### **Conclusions:**

- 1) What does the disappearance of reaction (after the destruction of the spinal cord)indicate?
- 2) Where are motor centers located?
- 1.

## 2.