

## UNIT VI. THE NERVOUS SYSTEM

### 1. Words to remember

auditory ['ɔ:dit(ə)rɪ] – слуховой	myelinated ['maɪlɪˌneɪtɪd] – миелинизированный
autonomic [ˌɔ:təˈnɒmɪk] – автономный	parasympathetic [ˌpærəˌsɪmpəˈθetɪk] – парасимпатический
bundle ['bʌndl] – пучок	perceiving [pəˈsi:vɪŋ] – восприятие
cluster ['klʌstə] – скопление	processing ['prəʊsesɪŋ] – переработка
collective [kəˈlektɪv] – собирательный	respond [rɪˈspɒnd] – отвечать, реагировать
cortical ['kɔ:tɪk(ə)l] – корковый, кортикальный	root [ru:t] – корень
dorsal ['dɔ:s(ə)l] – спинной, дорсальный	somatic [səˈmætɪk] – соматический
ganglion ['gæŋɡliən] – ганглий	stimulus ['stɪmjələs] – раздражитель, стимул
innervate ['ɪnəveɪt] – иннервировать, раздражать	sympathetic [ˌsɪmpəˈθetɪk] – симпатический
interpret [ɪnˈtɜ:pɪt] – интерпретировать, расшифровывать	visceral ['vɪs(ə)r(ə)l] – висцеральный
	visual ['vɪʒuəl] – зрительный

### 2. Read the terms correctly and remember them

neuron ['njuərən], meninges [mɪˈnɪndʒi:z], hindbrain ['haɪndˌbreɪn], forebrain ['fɔ:ˌbreɪn], thalamus ['θæləməs], hypothalamus [ˌhaɪpəˈθæləməs], cerebrum [səˈri:brəm], midbrain ['mɪdˌbreɪn], medulla oblongata [mɪˈdʌləˌɒblŋˈɡɑ:tə], pons [pɒnz], cerebellum [ˌserɪˈbeləm], brainstem ['breɪnˌstɛm], myelin ['maɪlɪn], axon ['æksən]

### 3. Make up adjectives from the following nouns

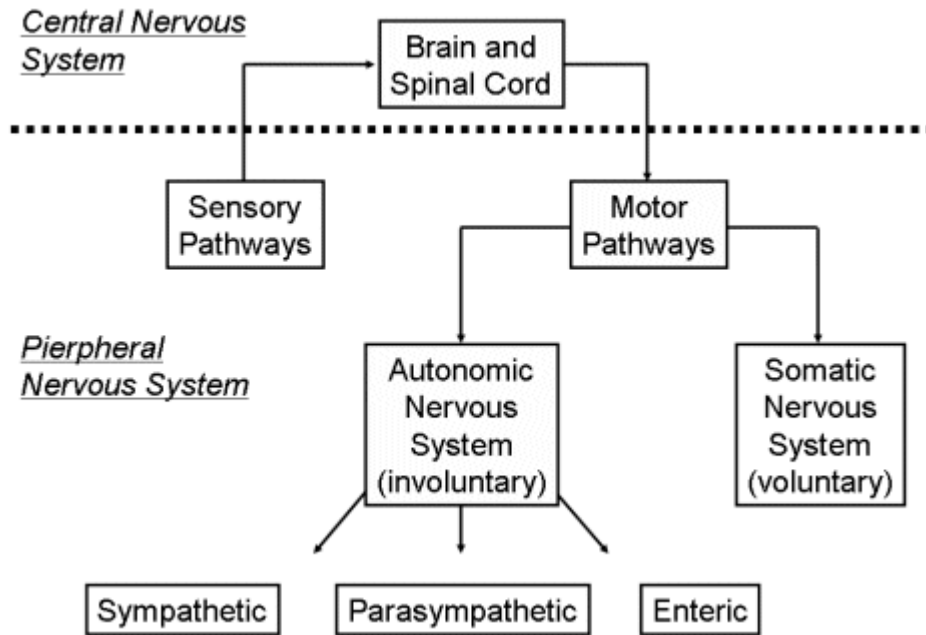
neuron, ganglion, thalamus, brain, hear, nerve, sense, meninges, vision.

**Model:** cortex – cortical

### 3. Read the text and divide it into logical parts

#### NERVOUS SYSTEM

The nervous system consists of the brain, spinal cord, and a complex network of neurons. This system is responsible for sending, receiving, and interpreting information from all parts of the body. The nervous system coordinates internal organ functions and responds to changes in the external environment. This system can be divided into two parts: the central nervous system and the peripheral nervous system.



The central nervous system (CNS) receives information from and sends information to the peripheral nervous system. The two main organs of the CNS are the brain and spinal cord. The brain processes and interprets sensory information sent from the spinal cord. Both the brain and spinal cord are protected by three layers of connective tissue called the meninges.

The brain is the control center of the body. It consists of three main components: the forebrain, the brainstem, and the hindbrain. The forebrain is responsible for a variety of functions including receiving and processing sensory information, thinking, perceiving, producing and understanding language, and controlling motor function. The forebrain contains structures such as the thalamus and hypothalamus, which are responsible for such functions as motor control, relaying sensory information, and controlling autonomic functions. It also contains the largest part of the brain, the cerebrum. Most of the actual information processing in the brain takes place in the cerebral cortex.

The midbrain and the hindbrain together make up the brainstem. The midbrain is the portion of the brainstem that connects the hindbrain and the forebrain. This region of the brain is involved in auditory and visual responses as well as motor function.

The hindbrain extends from the spinal cord and contains structures such as the pons and cerebellum. These regions assist in maintaining balance and equilibrium, movement coordination, and the conduction of sensory information. The hindbrain also contains the medulla oblongata, which is

responsible for controlling such autonomic functions as breathing, heart rate, and digestion.

The peripheral nervous system (PNS) is a collective term for the nervous system structures that do not lie within the CNS. The large majority of the axon bundles called nerves belong to the PNS. The PNS is divided into somatic and visceral parts. The somatic part consists of the nerves that innervate the skin, joints, and muscles. The cell bodies of somatic sensory neurons lie in dorsal root ganglia of the spinal cord. The visceral part, also known as the autonomic nervous system, contains neurons that innervate the internal organs, blood vessels, and glands. The autonomic nervous system itself consists of two parts: the sympathetic and the parasympathetic nervous system.

The vertebrate nervous system can also be divided into areas called grey matter and white matter. Grey matter contains a high proportion of cell bodies of neurons. White matter is composed mainly of myelinated axons, and takes its color from the myelin. White matter includes all of the peripheral nerves, and much of the interior of the brain and spinal cord. Grey matter is found in clusters of neurons in the brain and spinal cord, and in cortical layers that line their surfaces.

#### **5. Answer the following questions:**

1. What is the structure of the nervous system? 2. What is the nervous system responsible for? 3. What is the function of the nervous system? 4. How can nervous system be divided? 5. What are the main parts of the nervous system? 6. What is the function of the brain? 7. How are the organs of the nervous system protected? 8. What does the brain consist of? 9. What is the forebrain responsible for? 10. What does the brainstem consist of? 11. What is the function of the midbrain? 12. What is the function of the hindbrain? 13. How is the peripheral nervous system divided? 14. What are the sympathetic and parasympathetic nervous systems? 15. What is the grey and white matter?

#### **6. Read the sentences. Are these statements true (T) or false (F)?**

1. The brain and spinal cord are the parts of the PNS. 2. Information is sent from the PNS to CNS. 3. The forebrain is responsible for thinking. 4. Thalamus and hypothalamus are parts of the forebrain. 5. Cerebrum makes up the brainstem. 6. The brainstem connects the hindbrain and the forebrain. 7. The medulla oblongata is responsible for digestion. 8. The peripheral nervous system lies in the central nervous system. 9. The PNS is divided into two parts. 10. Grey matter and white matter are the parts of the vertebrate nervous system.

## 7. Choose a necessary word from those in brackets

1. All vertebrates have a nervous system which act as the major (coordinating / maintaining / supporting) organ of the body.
2. Nervous tissue underlies the ability to sense the environment, to move and react to (response / stimuli / reaction).
3. The organ responsible for processing information, thinking and understanding language is the (midbrain / forebrain / hindbrain).
4. The peripheral nervous system (receives / processes / carries) impulses to and from the central nervous system.
5. Each spinal nerve is (formed / led / attached) to the spinal cord by a sensory and a motor root.
6. The command to initiate a movement is received from the (nerves / cerebral cortex / peripheral nervous system).
7. White matter consists of axons coated with light-colored (neuron / myelin / ganglion) produced by certain neuroglia cells.
8. The nerves carry impulses to the (spinal cord / brain / PNS).
9. The nerve cell, which is the principal unit of the (spinal cord / nervous tissue / cerebral cortex), is highly excitable and able to rapidly conduct excitation.
10. Part of the brain involved in auditory and visual responses is known as (thalamus / meninges / midbrain).

## 8. Read the text on the structure of the nervous system. Then put these words and phrases in the correct place in the diagram

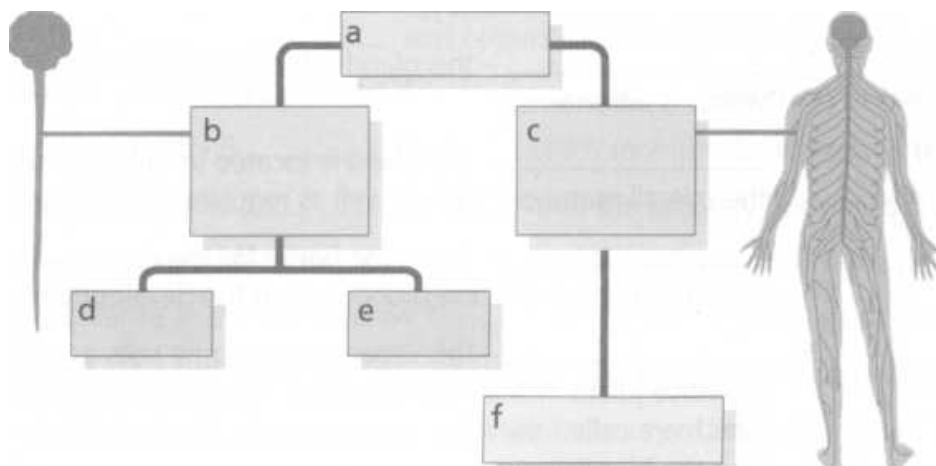
- |                   |                                    |                 |
|-------------------|------------------------------------|-----------------|
| 1. brain          | 2. central nervous system (CNS)    | 3. nerve fibres |
| 4. nervous system | 5. peripheral nervous system (PNS) | 6. spinal cord  |

### The structure and function of the nervous system

The nervous system responds quickly to changes (stimuli). It receives information from the environment, and passes it through the body to the point where the body can make sense of the information and respond to it. The nervous system has two main parts: the central nervous system (**CNS**) and the peripheral nervous system (**PNS**). The CNS is the main control centre in the human body and it consists of the brain and the spinal cord. The PNS is an extensive network of nerves extending from the CNS throughout the body.

The nervous system links receptors with effectors. Receptors, such as the sense organs, receive informatics from the environment. They respond to a change in the surrounding environment, which is called a stimulus, by sending a message through the peripheral nervous system to the central nervous system. In the CNS, a decision is made about how to respond and a message is sent through the peripheral nervous system to an effector, such as a

muscle. The action that is made is called the response or action. For example, when you see a ball heading towards you, the eye is the receptor and sends a message from the eye to the brain. Then, the brain decides that the best way to respond is to kick the ball. Lastly, the brain sends messages to the leg and foot muscles to prepare to kick the ball.



### 9. Match the beginning of the sentence to the ending

1. The nervous system coordinates	a. the pons and cerebellum
2. The nervous system consists of	b. by meninges
3. The hindbrain contains	c. of myelinated axons
4. The medulla oblongata is responsible for	d. clusters of neurons in the brain and spinal cord
5. The brain and the spinal cord are protected	e. autonomic functions as breathing, heart rate and digestion.
6. The midbrain is involved in	f. the CNS and PNS
7. Grey matter contains	g. internal organ function
8. White matter is composed mainly of	h. a high proportion of cell bodies of neurons
9. White matter includes all of the	i. peripheral nerves
10. Grey matter is found in	j. auditory and visual responses

### 10. Read the text and match the sentences below to the diagram

#### VOLUNTARY ACTIONS

An example of a voluntary movement is when someone responds to a tap on the shoulder by turning their head in the direction where the touch was applied. When the shoulder is tapped, receptors in the skin respond to the touch stimulus by sending a message along a nerve to the spinal cord and brain. At this point, a decision can be made about whether to turn and see what caused the stimulus or not to turn because there is something more important to look at. If the decision is to turn and look, an impulse is sent from the brain through a nerve to the muscles in the neck, which