

Class: X
Subject: Biology
Topic: Control and coordination
No. of Questions: 20

Q1. From where do the cranial nerves arise?

- a) Brain
- b) Receptors
- c) Spinal cord
- d) Effectors

Ans. (a)

Cranial nerves are pairs of nerves that originate in the brain stem and pass out of the skull to the surface of the body. There are 12 pairs of cranial nerves in mammals, birds, and reptiles. Some are motor nerves, controlling muscle movement; some are sensory nerves conveying information from sense organs, and others contain fibres for both sensory and motor impulses.

Spinal cord is a whitish cord of nervous tissue extending from the bottom of the brain through the spinal column and giving rise to pairs of spinal nerves that supply information to the body. The brain and spinal cord constitute the central nervous system. They receive information from all parts of the body and integrate it. Cranial nerves arise from brain whereas spinal nerves arise from spinal cord.

Effectors are responding organs or muscles. Reflex consists of stimulation of an afferent nerve through a sense organ or receptor, followed by transmission of the stimulus, usually through a nerve centre, to an efferent motor nerve, resulting in action of muscles or glands called effectors.

Q2. _____ protect(s) the spinal cord.

- a) Meninges
- b) Cranium
- c) Skull
- d) Vertebral column

Ans. (d)

Vertebral column is a common name applied to the structure of bones and cartilage (fibrous connective tissue) surrounding and protecting the spinal cord in vertebrate animals. It is also called spinal column, spine or backbone.

Meninges are the membranes that surround and protect the brain and spinal cord. These are further divided into three membranes, i.e. dura mater, arachnoid mater and pia mater.

So, option (1) cannot be the answer.

Cranium is a part of skull that covers the brain in vertebrates.

Skull is a skeletal part of vertebrate head, consisting of cranium that encases the brain.

Q3. A nerve impulse leaves a neuron through _____.

- a) nucleus
- b) axon terminal
- c) cyton
- d) dendrite

Ans. (b)

Nervous tissue is made up of an organized network of nerve cells or neurons and is specialized for conducting information via electrical impulses from one part of the body to another.

The information, acquired at the end of dendritic tip of a nerve cell, sets off a chemical reaction that creates an electrical impulse. This impulse travels from dendrite to cell body, and then along the axon to its end. At the end of axon, the electrical impulse sets off the release of some chemicals. These chemicals start a similar electrical impulse in a dendrite of the next neuron. Thus, the flow of nerve impulse is: dendrite → cell body → axon.

Nucleus is not the answer. Each nerve cell consists of a central portion known as cell body, containing the nucleus.

Cyton refers to cell body. It is the part of the cell body that contains nucleus. It is also known as soma.

Dendrite cannot be the answer. Dendrites are the branched extensions of the nerve cell that receive electrical signals from other neurons and conduct them to the cell body.

Therefore, the correct answer is 'axon terminal'.

Q4. What is the structural and functional unit of nervous system?

- a) Nephron
- b) Brain
- c) Neuron
- d) Sarcomere

Ans. (c)

Cell is structural and functional unit of life. This means that all organisms are made up of cells (structural) and they perform various functions (functional).

Similarly, structural and functional unit of nervous system is neuron (nerve cell). Neurons are cells specialized for conducting information via electrical impulses from one part of the body to other part of the body.

Nephron is not the answer as it is basic unit of kidney. Nephrons filter the blood and cause waste products to be removed in the form of urine.

Brain is the controlling centre of the nervous system, which is enclosed in the skull. The brain controls movement, sleep, hunger, thirst and the activities necessary for the body. So, brain is not a structural and functional unit of the nervous system.

Sarcomere is a part of muscle fibres. Therefore, it is not the answer.

∴ The correct answer is 'Neuron'.

Q5. Which of the following chains best represents the directional flow of nerve impulse along a neuron?

- a) Dendrite → Cell body → Axon
- b) Axon → Cell body → Dendrite
- c) Cell body → Dendrite → Axon
- d) Dendrite → Axon → Cell body

Ans. (a)

The information acquired at the end of the dendritic tip of a nerve cell sets off a chemical reaction that creates an electrical impulse. This impulse travels from the dendrite to the cell body and then, along the axon to its end. At the end of the axon, the electrical impulse sets off the release of some chemicals. These chemicals start a similar electrical impulse in a dendrite of the next neuron. The flow of nerve impulse is: Dendrite → Cell body → Axon. Options (2) and (3) are incorrect answers as the first step of acquiring information from various body parts is done by dendrites and not by axon and cell body.

The information acquired by dendrites is passed to cell body as dendrites are attached to cell body and not to the axon. Therefore, option (4) is incorrect.

Q6. Which part of nerve cell contains nucleus?

- a) Dendrite
- b) Cell body
- c) Axon
- d) Node of Ranvier

Ans. (b)

Each neuron is composed of a

- (1) cell body, called a soma
- (2) a major fibre, called an axon
- (3) system of branches called dendrites

Nucleus is the most prominent structure in a cell. Typically, it is round and occupies 10% of the cell's total volume. Nucleus, in the nerve cell, is present inside the cell body. It is the largest organelle in a nerve cell, which cannot accommodate in dendrites; axons are fibrous structures and are involved in transmission of impulses.

Node of Ranvier – Most of the axons are covered with a protective sheath of myelin, a

substance made up of fats and proteins. Myelinated axons conduct neuronal signals faster than the un-myelinated axons. Nerve impulses are propagated at specific points along the myelin sheath. These points are called 'Nodes of Ranvier'.

Q7. At the end of axon, the _____ signal sets off release of some chemicals.

- a) physical
- b) electrical
- c) chemical
- d) electro chemical

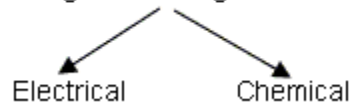
Ans. (d)

Information travels along the following path in a nerve cell:

Dendritic tip → Cell body → Axon → Electrical impulse

The electrical impulses set off the release of some chemicals. These chemicals start a new electrical impulse in the dendrite of the next neuron.

Two types of phenomena are involved in the processing of nerve signal.



Electrical events propagate a signal within a neuron and chemical processes transmit the signal from one neuron to another neuron. When the electrical signal reaches the tip of an axon, it stimulates small pre-synaptic vesicles in the cell. These vesicles contain chemicals called neurotransmitters, which are released into the microscopic space between the neurons. The neurotransmitters attach to the specialized receptors on the surface of adjacent neuron. This stimulus causes the adjacent cell to depolarize and propagate an action potential of its own.

Therefore, the electro chemical signal (4) sets off release of some chemicals at the end of axon.

Physical (touch) or mechanical (machines) impulses cannot be involved in the transmission of impulse at end of axon or throughout the nerve conduction.

Q8. Which is the most complex and highly specialized part of the brain?

- a) Cerebellum
- b) Cerebrum
- c) Spinal nerve
- d) Medulla oblongata

Ans. (b)

Brain, is a portion of the central nervous system.

Most of the specific functions of the brain take place in the cerebrum. Its two large

hemispheres make up approximately 85% of the brain's weight. The two cerebral hemispheres are partially separated from each other by a deep fold known as 'longitudinal fissure'. Cerebrum is also known as "little brain". The cerebrum receives information from all the sense organs and sends motor commands (signals that result in activity in the muscles or glands) to other parts of the brain and rest of the body. Therefore, the most complex and highly specialised part of the brain is cerebrum.

Q9. The information acquired at the dendritic tip of the nerve cell sets off a chemical reaction. What type of impulses does this chemical reaction create?

- a) Physical
- b) Electrical
- c) Mechanical
- d) Chemical

Ans. (b)

The information acquired at the end of dendritic tip of a nerve cell sets off a chemical reaction that creates an electrical impulse. This impulse travels from the dendrite to the cell body, and then along the axon to its end. At the end of axon, the electrical impulse sets off the release of some chemicals. These chemicals across the gap start a similar electrical impulse in a dendrite of the next neuron. Therefore, only two types of impulses are involved in processing nerve signal viz, electrical and chemical. Physical (touch) or mechanical (machines) impulses cannot be involved in the transmission of impulse at the end of axon or throughout the nerve conduction.

Q10. Which of the following actions is not a reflex action?

- a) Salivation on sight of food
- b) Pulling of hand when pricked with a needle
- c) Withdrawal of hand on touching hot plate
- d) Running fast to win a race

Ans. (d)

Reason – Reflex is an action that occurs automatically and involuntarily as a result of the nervous system's reaction to the stimulus. Reflex occurs very fast. For example, our mouth waters when we see delicious food. Running fast to win a race is not an example of a reflex action as it is being done voluntarily.

Q11. Synapse is the small gap between two _____.

- a) neurons
- b) veins
- c) arteries

d) capillaries

Ans. (a)

Synapse is a gap between neurons. At the end of an axon, the electrical impulse sets off the release of some chemicals. These chemicals start a similar electrical impulse across a synapse in a dendrite of the next neuron.
Therefore, the correct answer is neuron (nerve cell).

Q12. Which of the following activities is not under the control of “medulla” in hind brain?

- a) Salivation
- b) Vomiting
- c) Blood pressure
- d) Hearing

Ans. (d)

Medulla, in hind brain, controls the autonomic functions like salivation, vomiting, blood pressure, swallowing, etc.

Q13. Medulla oblongata passes below into _____.

- a) cerebellum
- b) spinal cord
- c) brain
- d) veins

Ans. (b)

Medulla oblongata is the lower part of brain in vertebrate. It passes below into or is continuous with spinal cord and controls involuntary functions such as those involved with the heart or lungs.
Cerebellum is not the answer as it controls only body movements and is located in the lower back part of the brain.
Brain is a portion of the central nervous system, which is contained within the skull. The brain and spinal cord constitute the central nervous system.
Veins are found in blood circulatory system.

Q14. Connection between the central nervous system and other parts of the body is facilitated by _____.

- a) peripheral nervous system
- b) brain
- c) spinal cord
- d) muscles

Ans. (a)

Peripheral nervous system is that part of nervous system that lies outside the brain and spinal cord. Nervous system is divided into:

Peripheral nervous system carries signals to and from all parts of the body.

This means that the communication between central nervous system and other parts of the body is facilitated by peripheral nervous system, which consists of cranial nerves arising from brain and spinal nerves.

Q15. Unidirectional transmission of nerve impulse is ensured by structures called _____.

- a) synapse
- b) nodes of Ranvier
- c) axons
- d) nephron

Ans. (a)

Nerve impulse is passed from one neuron to another. The gap between two neurons is known as synapse. The chemical signal from axon is transferred to the synapse and then to the dendrites of the other neuron. Signal cannot be transmitted back from synapse to axon. The transmission of impulse is unidirectional (one-way).

Q16. Information from environment is detected by the specialized tip of nerve cells known as _____.

- a) axon
- b) nerve ending
- c) cyton
- d) dendrite

Ans. (d)

Dendrites are branched extensions of nerve cells or neurons that receive signals from environment or from other neurons and conduct those signal to the cell body.

Q17. Which structure carries the message from the sensory organs?

- a) Sensory neuron
- b) Relay neuron
- c) Motor neuron
- d) Nerve impulse

Ans. (a)

Option (1) is correct.

Q18. Which of the following actions is not a reflex action?

- a) Blinking of eyes
- b) Shouting
- c) Yawning
- d) Sneezing

Ans. (b)

Reflex occurs automatically and involuntarily because of the nervous system's reaction to stimulus. Reflex occurs very fast.

Blinking of eye occurs automatically and cannot be controlled voluntarily. Therefore, it is an example of reflex action.

Shouting is done voluntarily.

∴ It is not an example of reflex action.

When one is feeling sleepy, he or she yawns.

Therefore, it is a process, which occurs automatically.

Hence, yawning is an example of a reflex action.

Sneezing also occurs automatically. Therefore, sneezing is an example of a reflex action.

Q19. One of the three basic parts of a neuron is _____.

- a) axon
- b) myelin
- c) pons
- d) dura mater

Ans. (a)

Each neuron (nerve cell) is composed of a

(1) cell body, called a soma

(2) a major fibre, called an axon

(3) system of braches, called dendrites

Myelin is not a part of neuron. It is a whitish material made up of proteins and fats. It surrounds some nerve cells in concentric sheets, insulating adjacent nerve fibres and enabling transmission of nerve impulses.

Pons is a whitish band of nerve fibres on the surface of brainstem between the medulla oblongata and midbrain. This bundle of nerve fibres contains neural connections among cerebrum, cerebellum, and medulla oblongata.

Dura mater- Between the brain and the cranium (the part of the skull that directly covers the brain), are three protective membranes or Meninges (brain layers). The outermost membrane is called dura mater, which is the toughest and thickest. Below the dura mater,

there is a middle membrane, called arachnoid mater. The innermost membrane, the pia mater, mainly consists of small blood vessels.

- Q20. The junction between axon and dendrites of two neurons is called
- a) synapse
 - b) neuromuscular junction
 - c) node of Ranvier
 - d) myelin sheath

Ans. (a)

Synapse is a gap between two neurons.

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