

Chapter 15

Nervous System

I. Choose the correct Answer:

Question 1.

Bipolar neurons are found in:

- (a) retina of eye
- (b) cerebral cortex
- (c) embryo
- (d) respiratory epithelium

Answer:

- (a) retina of eye

Question 2.

The site for processing of vision, hearing, memory, speech, intelligence, and thought is _____

- (a) kidney
- (b) ear
- (c) brain
- (d) lungs

Answer:

- (c) brain

Question 3.

In reflex action, the reflex arc is formed by:

- (a) brain, spinal cord, muscle
- (b) receptor, muscle, spinal cord
- (c) muscle, receptor, brain
- (d) receptor, spinal cord, muscle

Answer:

- (d) receptor, spinal cord, muscle

Question 4.

Dendrites transmit impulse _____ cell body and axon transmit impulse _____ cell body.

- (a) away from, away from
- (b) towards, away from
- (c) towards, towards
- (d) away from, towards

Answer:

- (b) towards, away from

Question 5.

The outer most of the three cranial meninges is:

- (a) arachnoid membrane
- (b) piamater
- (c) duramater
- (d) myelin sheath

Answer:

- (c) duramater

Question 6.

There are pairs of cranial nerves and pairs of spinal nerves.

- (a) 12, 31
- (b) 31, 12
- (c) 12, 13
- (d) 12, 21

Answer:

- (a) 12, 31

Question 7.

The neurons which carries impulse from the central nervous system to the muscle fibre

-
- (a) afferent neurons
 - (b) association neuron
 - (c) efferent neuron
 - (d) unipolar neuron

Answer:

- (c) efferent neuron

Question 8.

Which nervous band connects the two cerebral hemispheres of brain?

- (a) thalamus
- (b) hypothalamus
- (c) corpus callosum
- (d) pons

Answer:

- (c) corpus callosum

Question 9.

Node of Ranvier is found in:

- (a) muscles
- (b) axons
- (c) dendrites
- (d) cyton

Answer:

- (b) axons

Question 10.

Vomiting centre is located in _____

- (a) medulla oblongata
- (b) stomach
- (c) cerebrum
- (d) hypothalamus

Answer:

- (a) medulla oblongata

Question 11.

Nerve cells do not possess:

- (a) neurilemma
- (b) sareolemma
- (c) axon
- (d) dendrites

Answer:

- (b) sareolemma

Question 12.

A person who met with an accident lost control of body temperature, water balance, and hunger. Which of the following part of the brain is supposed to be damaged?

- (a) medulla oblongata
- (b) cerebrum
- (c) pons
- (d) hypothalamus

Answer:

- (d) hypothalamus

II. Fill in the blanks:

1. is the longest cell in our body.
2. Impulses travels rapidly in neurons.
3. A change in the environment that causes an animal to react is called
4. carries the impulse towards the cell body.
5. The two antagonistic component of autonomic nervous system are and
6. A neuron contains all cell organelles except
7. maintains the constant pressure inside the cranium.
8. and increases the surface area of cerebrum.
9. The part of human brain which acts as relay center is

Answer:

1. Nerve cell or neuron
2. sensory
3. stimulus
4. Dendrites
5. sympathetic and parasympathetic system

6. Nucleus
7. Cerebro Spinal Fluid (CSF)
8. Gyri and sulci
9. thalamus

III. State whether true or false, if false write the correct statement:

1. Dendrons are the longest fibres that conducts impulses away from the cell body.
2. Sympathetic nervous system is a part of central nervous system.
3. Hypothalamus is the thermoregulatory centre of human body.
4. Cerebrum controls the voluntary actions of our body.
5. In the central nervous system myelinated fibres form the white matter.
6. All the nerves in the body are covered and protected by meninges.
7. Cerebrospinal fluid provides nutrition to brain.
8. Reflex arc allows the rapid response of the body to a stimulus.
9. Pons helps in regulating respiration.

Answer:

1. False – Axons are the longest fibres that conducts impulses away from the cell body.
2. False – Autonomic nervous system is a part of central nervous system.
3. True
4. False – Cerebellum controls the voluntary actions of our body.
5. True
6. False – Brain is covered and protected by meninges.
7. True
8. True
9. True

IV. Match the following:

Column I		Column II	
A	Nissil's granules	(i)	Forebrain
B	Hypothalamus	(ii)	Peripheral Nervous system
C	Cerebellum	(iii)	Cyton
D	Schwann cell	(iv)	Hindbrain

Answer:

- A. (iii)
- B. (i)
- C. (iv)
- D. (ii)

V. Understand the assertion statement. Justify the reason given and choose the correct choice:

- (a) Assertion is correct and reason is wrong.
- (b) Reason is correct and the assertion is wrong.
- (c) Both assertion and reason are correct.
- (d) Both assertion and reason are wrong.

1. Assertion: Cerebrospinal fluid is present throughout the central nervous system.

Reason: Cerebrospinal fluid has no such functions.

Answer:

- (a) Assertion is correct and reason is wrong.

2. Assertion: Corpus callosum is present in space between the duramater and . piamater.

Reason: It serves to maintain the constant intracranial pressure.

Answer:

- (d) Both assertion and reason are wrong.

VI. Short Answer Questions:

Question 1.

Define the stimulus.

Answer:

The changes in the environmental condition that are detected by the receptors present in the body is called stimulus.

Question 2.

Name the parts of the hindbrain.

Answer:

The hindbrain is formed of three parts. Cerebellum, Pons and Medulla Oblongata.

Question 3.

What are the structures involved in the protection of brain?

Answer:

Cranium (skull) and three connective tissue membrane meninges – Duramater, Arachnoid membrane and piamater protect the brain.

Question 4.

Give an example for conditioned reflexes.

Answer:

The conditioned reflexes are the result of practice and learning. Playing the harmonium by striking a particular key, on seeing a music note is an example of conditioned reflexes.

Question 5.

Which acts as a link between the nervous system and endocrine system?

Answer:

Hypothalamus is the link between nervous system and endocrine system as it controls the secretion of hormones from anterior pituitary gland.

Question 6.

Define reflex arc.

Answer:

The path taken by nerve impulse to accomplish reflex action is called a Reflex arc.

VII. Differentiate between:

Question 1.

Voluntary and involuntary actions.

Answer:

Voluntary action	Involuntary action
Controlled by Cerebrum.	Controlled by Medulla Oblongata.
Under conscious control based on our needs.	Not under conscious control.
Eg: Writing, speaking	Eg: Heart beat, breathing, digestion

Question 2.

Medullated and non-medullated nerve fibre.

Answer:

Medullated nerve fibre	Non-medullated nerve fibre
When the axon is enclosed by the white fatty myelin cover it is medullated neuron.	When the neuron is not enclosed by myelin sheath appears grey is called non-medullated neuron.
This form the cerebral cortex of our brain.	This is found in the white matter of cerebrum.

VIII. Long Answer Questions:

Question 1.

Illustrate the structure and functions of brain.

Answer:

The human brain is divided into 3 major parts. Fore brain, Mid brain and Hind brain.

Fore brain consists of Cerebrum, Thalamus and Hypothalamus.

Parts of the brain	Function
Cerebrum	It is responsible for the thinking, intelligence, consciousness memory, imagination, reasoning and will power.
Thalamus	It is a major conducting centre for sensory and motor signalling.
Hypothalamus	It controls involuntary functions like hunger, thirst, sleep, sweating, sexual desire, anger, fear, water balance, blood pressure. It controls the secretion of hormones from anterior pituitary gland. It acts as thermo regulator.

Mid brain

Parts of the brain is Corpora quadrigemina

Function is control visual and auditory reflexes.

Hind brain consists of Pons, Cerebellum and Medulla Oblongata.

Parts of the brain	Function
Cerebellum	It coordinates voluntary movements and also maintains body balance.
Pons	It relay signals between the Cerebellum, Spinal cord, Mid brain and Cerebrum. It controls respiration and sleep cycle.
Medulla Oblongata	It has cardiac centres, respiratory centres, vaso motor centres to control heart beat, respiration and contractions of blood vessels. It also regulates Vomiting and Salivation.

Question 2.

What will you do if someone pricks your hand with a needle? Elucidate the pathway of response with a neat labelled diagram.

Answer:

If we touch a sharp pointed object, we immediately withdraw our hand.

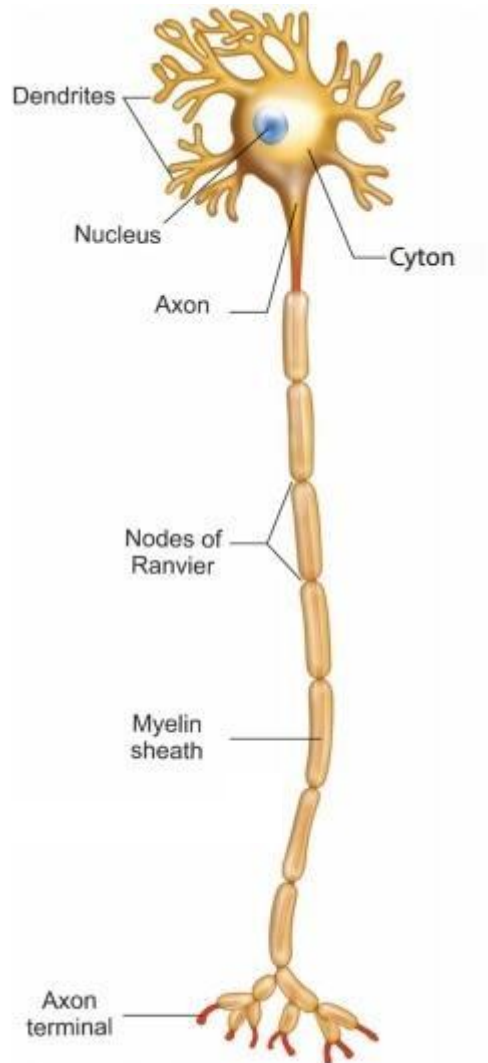
Here the skin is the receptor and it receives the stimulus, that is the pain. This stimulus (pain) in turn triggers an impulse in sensory neuron. The sensory neuron transmits or convey the message to the spinal cord. Spinal cord interprets the stimulus and the impulse is passed on to the relay neuron which in turn transmits it to a motor neuron. Motor

neuron carry command from the spinal cord to our arm. Muscle in our arm contracts and we withdraw our hand immediately

Question 3.

With a neat labelled diagram explain the structure of a neuron.

Answer:



Structure of Neuron

A neuron is the basic structural and functional unit of the nervous system. A neuron consists of Cyton, Dendrites and Axon.

Cyton : It has a central nucleus with abundant cytoplasm called neuroplasm. The cytoplasm has large granular body called Nissl's granules and the other cell organelles like mitochondria, ribosomes, lysosomes, and endoplasmic reticulum.

Dendrites : These are the numerous branched cytoplasmic processes that project from the surface of the cell body. They conduct nerve impulses towards the cyton.

Axon : The axon is a single, elongated, slender projection. The end of axon terminates as fine branches which terminate into knob like swellings called synaptic knob. The plasma membrane of axon is called axolemma, while the cytoplasm is called axoplasm. It carries impulses away from the cyton. The axons may be covered by a protective sheath called myelin sheath which is further covered by a layer of Schwann cells called neurilemma. Myelin sheath breaks at intervals by depressions called Nodes of Ranvier. The region between the nodes is called as internode. Myelin sheath acts as insulator and ensures rapid transmission of nerve impulses.

Question 4.

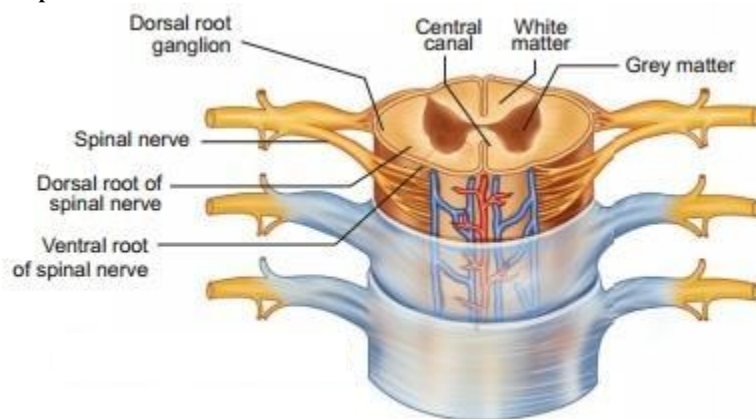
Describe the structure of spinal cord.

Answer:

Spinal cord is a cylindrical structure lying in the neural canal of the vertebral column. It is also covered by meninges.

It extends from the lower end of medulla oblongata to the first lumbar vertebra. The posterior most region of spinal cord tapers into a thin fibrous thread like structure called filum terminale.

Internally, the spinal cord contains a cerebrospinal fluid filled cavity known as the central canal. The grey matter of spinal cord is 'H' shaped. The upper end of letter 'H' forms posterior horns and lower end forms anterior horns. A bundle of fibres pass into the posterior horn forming dorsal or afferent root. Fibres pass outward from the anterior horn forming ventral or efferent root. These two roots join to form spinal nerves. The white matter is external and has bundle of nerve tracts. Spinal cord conducts sensory and motor impulses to and from the brain. It controls reflex actions of the body.



Structure of spinal cord

Question 5.

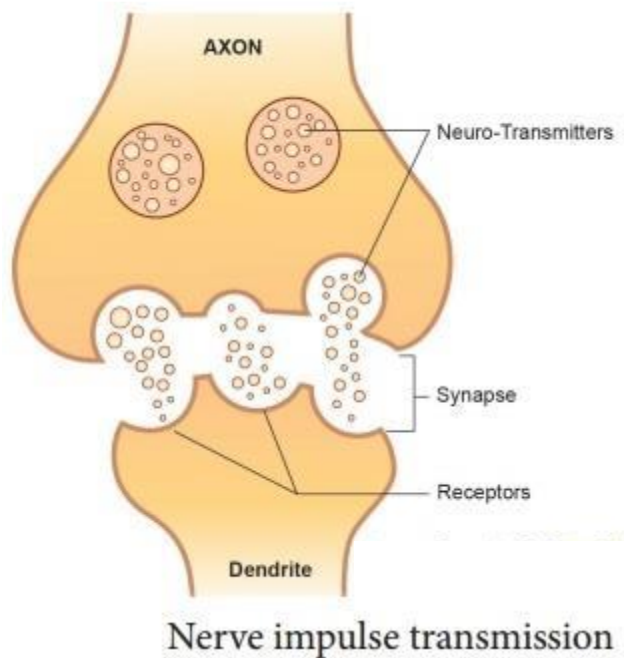
How nerve impulses are transferred from one neuron to next neuron?

Answer:

The information from the environment are detected by the receptors located in our sense organs such as the eyes, the nose, the skin etc..

Information from the receptors is transmitted as electrical impulse and is received by the dendritic tips of the neuron.

This impulse travels from the dendrite to the cell body and then along the axon to its terminal end.



On reaching the axonal end, it causes the nerve endings to release a chemical (neuro transmitter) which diffuses across a synapse and starts a similar electrical impulse in the dendrites of the next neuron, then to their cell body to be carried along the axon.

In this way, the electrical signal reaches the brain or spinal cord. The response from brain (or spinal cord) is similarly passed on to the effector organs such as the muscle or gland cell, that undergoes the desired response.

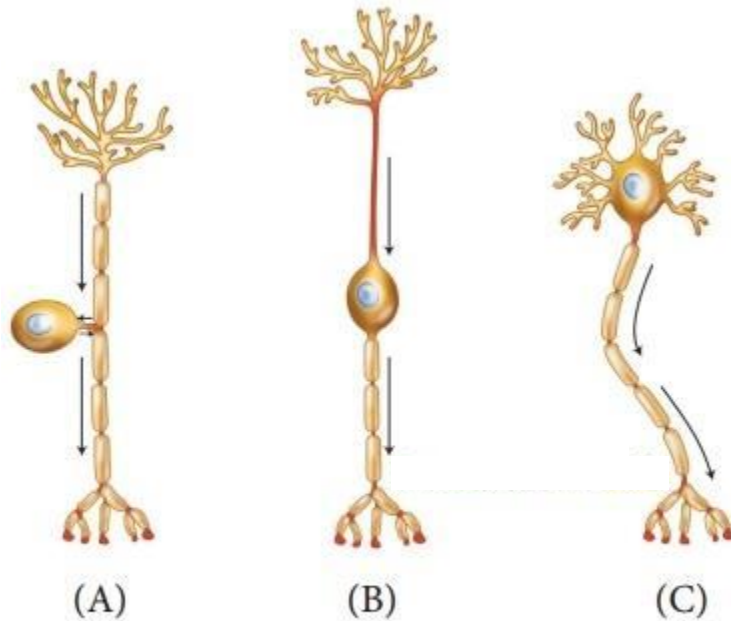
The flow of nerve impulses from axonal end of one neuron to dendrite of another neuron through a synapse is called synaptic transmission.

Question 6.

Classify neurons based on its structure.

Answer:

The neurons may be of different types based on their structure and functions. Structurally the neurons may be of the following types:



(A) Unipolar (A), Bipolar (B) and multipolar (C) neurons

- (i) Unipolar neurons: Only one nerve process arises from the cyton which acts as both axon and dendron.
- (ii) Bipolar neurons: The cyton gives rise to two nerve processes of which one acts as an axon while another as a dendron.
- (iii) Multipolar neurons: The cyton gives rise to many dendrons and an axon.

IX. Higher Order Thinking Skills: (HOTS)

Question 1.

'A' is a cylindrical structure that begins from the lower end of the medulla and extends downwards. It is enclosed in bony cage 'B' and covered by membranes 'C'. As many as 'D' pairs of nerves arise from the structure 'A'.

- (i) What is A?
- (ii) Name (a) bony cage 'B' and (b) membranes 'C'
- (iii) How much is D?

Answer:

- (i) Spinal cord
- (ii) (a) Cranium
- (b) Duramater, Arachnoid membrane, Piamater
- (iii) 31 pairs of Spinal nerves

Question 2.

Our body contains a large number of cells 'L' which are the longest cells in the body. L has long and short branch called as 'M' and 'N' respectively. There is a gap 'O' between two 'L' cells, through which nerve impulse transfer by release of chemical substance 'P'.

1. Name the cells L.
2. what are M and N?
3. What is the gap O?
4. Name the chemical substance P.

Answer:

1. L is Nerve cell or Neuron
2. M is axon and N is dendrite
3. Gap O is synaptic junction
4. P is neuro transmitter – Acetylcholine