

# Important Questions Class 11 Biology Chapter 18

## Neural Control and Coordination

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Very Short Answer Questions. (1 Mark)

1. How does an impulse travel across a synapse?

Ans. The impulse travels across a synapse from axons to the cell body and dendrites to the next neuron.

2. How many pairs of cranial nerves are present in a man?

Ans. 12 pairs of cranial nerves are present in man.

3. What is saltatory conduction?

Ans. Saltatory conduction refers to a type of conduction of nerve impulse by myelinated nerve fiber, wherein action potential jumps from one node of Ranvier to the other one.

4. Name the band of nerve fibers that joins the two cerebral hemispheres in mammals.

Ans. Corpus callosum is the band of nerve fibers that joins the two cerebral hemispheres in mammals.

5. What is the threshold stimulus for nerve cells?

Ans. The minimum strength of a stimulus required to start the depolarization of neurons is called threshold stimulus.

6. What is a compound eye?

Ans. In insects, the eye is composed of independent visual elements called ommatidia. These types of eyes are referred to as compound eyes.

7. What types of neurons are found in the dorsal root of the spinal nerve?

Ans. Sensory neurons are found in the dorsal root of the spinal nerve.

8. What is the basic unit of the neural system?

Ans. Neurons are the basic unit of the neural system.

9. Why is blind spot devoid of the ability for vision?

Ans. Blindspot has no photoreceptor cells – rods or cones hence it is devoid of the ability for vision.

10. Name the fluid present in the membranous labyrinth.

Ans. Endolymph is the fluid present in the membranous labyrinth.

11. Name the area of the retina where only cones are densely packed.

Ans. The fovea is the area of the retina where only cones are densely packed.

12. Name the innermost menning of the brain.

Ans. Piamater is the innermost menning of the brain.

13. To which part of the brain communication and memory are associated?

Ans: Cerebrum is the part of the brain where communication and memory are associated.

14. Name the bundle of fibers that connect two cerebral hemispheres in human beings.

Ans. The Corpus callosum is the bundle of fibers that connect two cerebral hemispheres in human beings.

15. Name the photopigment present in the rod cells.

Ans. Rhodopsin is the photopigment present in rod cells.

16. Why can impulses flow only in one direction?

Ans. Impulses flow only in one direction because each synapse allows the impulse to cross it in a single direction.

17. Where is the hypothalamus located in the brain?

Ans. Hypothalamus is located at the base of the thalamus in the brain.

#### Short Answer Questions (2 Marks)

1. What is a reflex?

Ans. Reflex is defined as an involuntary action that is performed by muscle under the direction of the spinal cord as a response to the stimulus. Since it is an automatic response to a stimulus hence it is not under any conscious control.

Example: Respiration, peristalsis, secretion of saliva in the mouth, etc.

2. What happens when the membrane of a nerve cell carries out a sodium pump?

Ans. When a membrane carries a sodium pump, it carries three sodium ions from axoplasm to the cell exterior:

- It transfers two potassium ions exchanged from the ECF to the cell interior.
- The exterior is positively charged.

3. What are the events that take place at the point of stimulation of the axon?

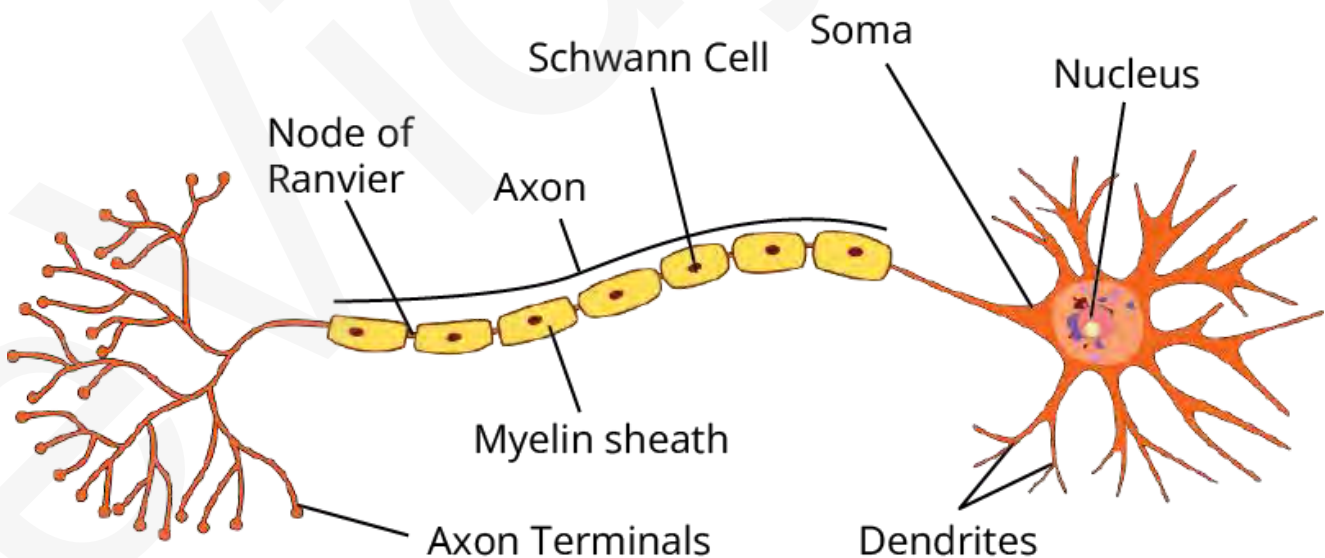
Ans. The events that take place at the point of stimulation of axon are-

- Membrane permeability changes; it becomes freely permeable to  $\text{Na}^+$  ions.
- The rapid inflow of  $\text{Na}^+$  ions occurs and the axoplasm becomes positively charged while the exterior becomes negatively charged. This is known as the depolarized state and the potential difference across the membrane is the action potential.
- The current flows through axoplasm from the depolarized region, to the next polarised region and through ECF from the polarised region to the depolarised region.

4. Give parts of the neuron.

Ans. The neuron is a microscopic structure made up of three parts:

1. Cell body – It contains cytoplasm with cell organelles and some granular bodies called Nissl's granules.
2. Dendrites – These are the short fibers that branch repeatedly and project out of the cell body. They transmit impulses towards the cell body (cyton).
3. Axon – It is a long fiber with branched distal ends. Each branch terminates into a bulb-like structure known as a synaptic knob.



## Structure of Neuron

5. Describe the role and location of the ciliary body in the human eye.

Ans. The choroid becomes thick where the cornea and the sclera meet and it is called the ciliary body.

The function of the ciliary body is that it continues in front of the lens to form an opaque structure called the iris.

6. What is the mosaic vision?

Ans. A type of vision that is found in insects due to the compound eye. In such a type of vision, a complete image of the object as seen by the compound eye is formed by a number of small lineages each of which is contributed by an ommatidium. Such an image formed by many bits of images is called a mosaic image and the vision is the mosaic image vision.

7. Where does cerebrospinal fluid occur in our body? Mention two of its functions.

Ans. Cerebrospinal fluid is found in the subarachnoid space between arachnids and

The parameter of the meninges around the brain and spinal cord and also in the cavities of the brain.

Its functions are:

- 1) It protects the brain and spinal cord by acting as a cushion to absorb shocks.
- 2) It helps in removing harmful metabolites, drugs, etc. away from the brain.

8. What is the chemical and difference between rods and cones?

Ans. The difference between rods and cones are listed below:

Rods

Cones

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These are more secretive to light and are meant for vision in dim light.

These are meant for vision in bright light

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They lack the ability to produce colored images.

They have the ability to produce colored images.

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They contain rhodopsin which is a visual pigment.

These contain iodopsin as the visual pigment.

9. Why are gray matter and white matter contained in the human nervous system named so?

Ans. Gray matter contains spindle, pyramidal, cell bodies with grayish brown appearance and hence named as gray matter.

The white matter contains innumerable myelinated axons, a large amount of myelin gives it tissue an opaque white appearance, therefore, called white matter.

10. Fill in the blanks in the different columns A to D:

Pinna (a)

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(b) Equalize the pressure on either side of the eardrum.

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Cone cells (c)

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(d) Regulate amount of light to pass into the eye.

Ans. The blanks are:

(a) To collect sound waves

(b) Eustachian tube

(c) Colour vision

(d) Iris

Short Answer Question (3 Marks)

1. Differentiate between dorsal spinal roots and ventral spinal roots.

Ans. The difference between dorsal spinal roots and ventral spinal roots are listed below:

Dorsal spinal roots	Ventral spinal roots
They are made of sensory nerves (afferent).	They are made of motor nerves (efferent).
They have dorsal root ganglia.	They lack ganglia.
Their cell bodies are located in dorsal root ganglia.	The cell bodies of the ventral spinal nerve root are located in the ventrolateral horn of grey matter.

2. Describe the human neural system.

Ans. The human neural system is divided into two parts:

1) Central Neural system (CNS) – It includes the brain and spinal cord and is the site of information processing and control.

2) Peripheral neural system (PNS) – PNS consists of all nerves of the body associated with the CNS. The nerve fibers of PNS are of two types i.e. afferent and efferent fibers.

(a) Afferent nerve fibers are responsible for transmitting impulses from tissues or organs to the CNS.

(b) Efferent nerve fibers are responsible for transmitting impulses from CNS to concerned peripheral tissues or organs.

PNS is further divided into –

(1) Somatic neural system which relays impulse from CNS to the skeletal muscles.

(2) Autonomic neural system transmits impulses from CNS to the involuntary organs as well as the smooth muscles of the body. It is divided into two parts -

a) Sympathetic neural system

b) Parasympathetic neural system

3. Why do giant squids have very thick nerve fiber?

Ans. The velocity of a nerve impulse in a nerve fiber depends on its myelinated and also on the thickness of the fibers. The impulses travel faster in thicker nerve fibers and as the giant squids are large-sized aquatic animals, they have thick nerve fibers.

4. Where are synaptic vesicles found? Name their chemical contents? What is the function of these contents?

Ans. Synaptic vesicles are found in the bulbous expansion called synaptic knob, at the nerve terminal. Each of the synaptic vesicles contains as many as 10,000 molecules of a neurotransmitter substance which is responsible for the transmission of nerve impulses across the synapse.

When a wave of depolarization reaches the presynaptic membrane, the voltage-gated calcium channels concentrated at the synapse open, and the  $\text{Ca}^{++}$  ions diffuse into a terminal from the surrounding fluid.

- The  $\text{Ca}^{++}$  ions stimulate synaptic vesicles to move to the terminal membrane, fuse with it and then rupture by exocytosis into the cleft.
- This neurotransmitter diffuses across the synapse and stimulates the membrane of the next neuron.

5. Give the location and function in the human eye, of the following –

(i) Cornea (ii) Iris (iii) Vitreous humor

Ans. 1) Cornea is the dome-shaped part of the sclera which is transparent and curved. It refracts light towards the retina.



2) Iris is the colored (pigmented) at the front and formed by choroid. It encloses the pupil and the iris contains ciliary muscles which regulate the size of the pupil and controls the amount of light.

3) Vitreous humor is present in the posterior chamber of the eye. It helps in shaping the eye and also supports the retina and the lens. It also refracts light rays.

6. Why are nerve impulses conducted more rapidly in myelinated nerve fiber than in a non – myelinated one? Explain.

Ans. In a myelinated nerve fiber, lipid-rich myelin acts as an insulator, and depolarization occurs in nodes of Ranvier wherein the myelin sheath is absent. Since the action potential jumps from one node to another, conduction becomes faster and such a type of conduction is called saltatory conduction.

In a non–myelinated fiber, this depolarization occurs all along its length thus slowing down the conduction.

7. Observe the diagram given right and answer the following questions:

- (i) Label the parts A and B
- (ii) Give the function of C and D.
- (iii) Name the layers which wrap this organ.



## Parts of Brain

Ans. The different parts of the given figure are:

(i) A: Cerebrum; B: Corpus callosum

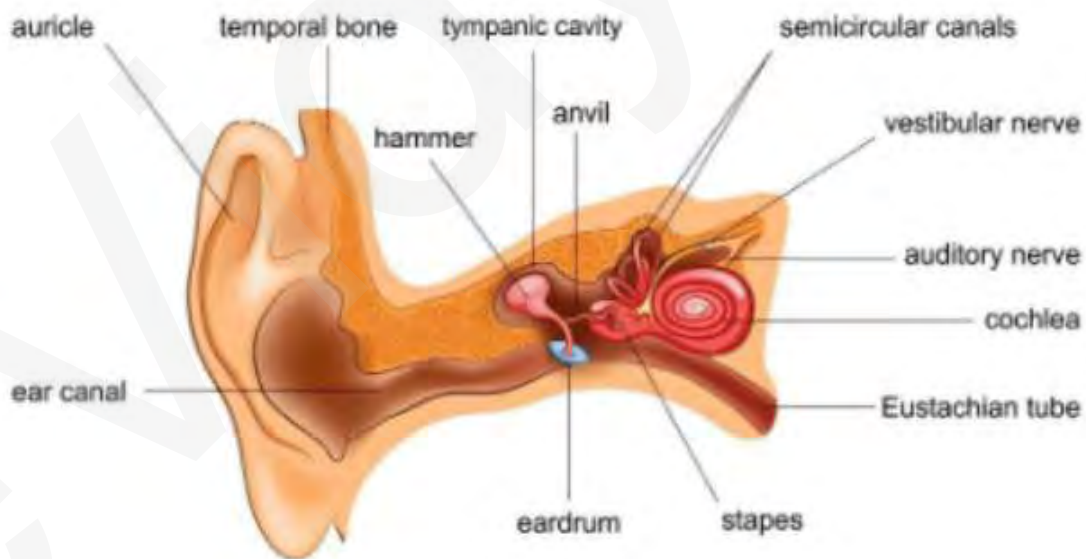
(ii) C: Balancing of body and maintain posture; D: Vomiting, coughing, breathing, salivation, or any other correct answer (any one).

(iii) Piameter, arachnoid and duramater.

## Long Answer Questions (5 Marks)

1. Draw a labeled diagram to show the structural view of the human ear in the sectional view.

Ans. The diagram to show the structural view of the human ear in the sectional view is below:

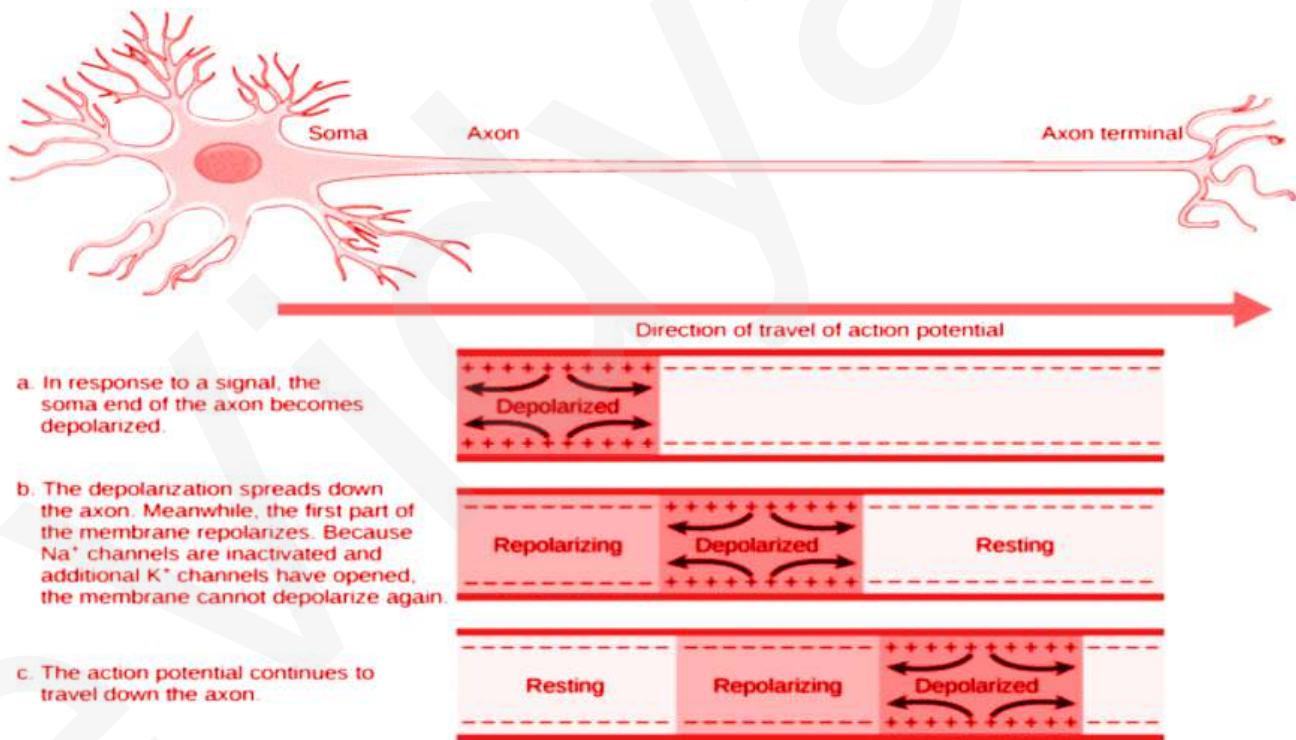


## Anatomy of Ear

2. What is meant by the resting membrane potential of a neuron? How do ion channels and sodium-potassium pumps contribute to the resting potential?

Ans. The resting membrane potential is the electrical potential difference across the membranes of a resting neuron is called resting membrane potential.

- The membrane is polarized with a negative interior and a positively charged exterior.
- The permeability of the membrane to  $K^+$  ions is greater than its permeability to the  $Na^+$  ions.
- Negatively charged protein molecules can cross the membrane.
- The sodium pump transports three  $Na^+$  ions to the exterior, while in exchange only  $2K^+$  ions come inside.
- Hence, the surface carries a positive charge, which the interior negatively charged.



### Transmission of Electrical Impulse Thorough Neuron

3. Reflex arc. Taking one example, describe the functioning of the various components of a spinal.

Ans. A reflex arc is the specific neural pathway from stimulus to reflex.

The components of reflex arc are-

(1) Receptors– These are the organs/tissues which receive stimulus and send it as an impulse.

(2) Sensory or afferent nerves – These are neurons that conduct the impulse from the receptor to the central Nervous system (spinal cord)

(3) Relay or intermediate neurons – These are neurons that conduct impulses from the afferent neurons to the efferent neurons.

(4) Effectors/motor neurons – These neurons conduct impulses from the spinal cord/relay neurons to the effectors' organ concerned.

(5) Effectors – It is the organ/tissue or gland that functions accordingly.