Chapter 7
Control and Coordination

Intext Questions

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Question 1: What is the difference between a reflex action and walking?

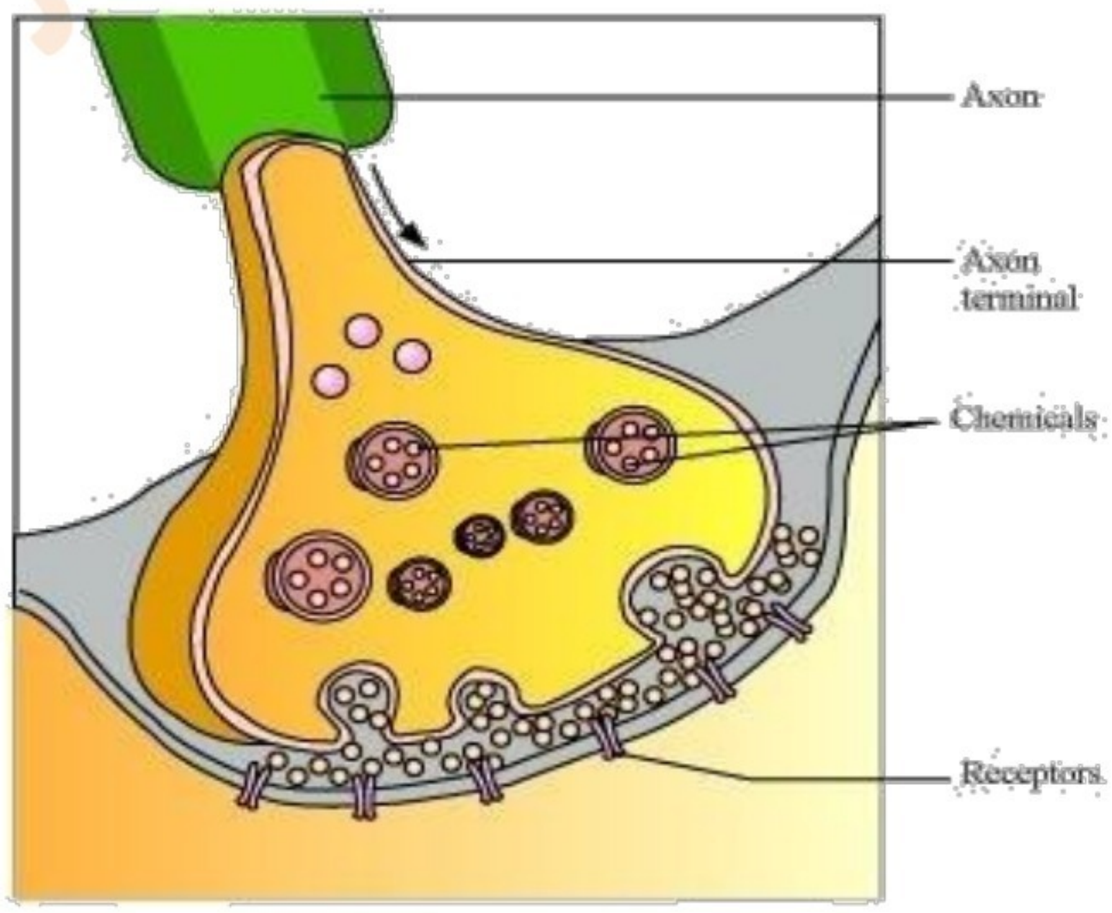
Solution: A reflex action is a rapid and automatic response to a stimulus. It does not involve any thinking. For example, we remove our hand immediately when our hand is touched by any hot thing.

Walking is a voluntary action. It is under our control.

Question 2: What happens at the synapse between two neurons?

Solution:

Synapse: It is a very small gap that is present between the last portion of axon of one neuron and the Dendron of the other neuron. It transmits impulses in one direction only. From axon, the impulses travel across the synapse to the Dendron of the other neuron.



Question 3: Which part of the brain maintains posture and equilibrium of the body?

Solution: Cerebellum (a part of hindbrain) is responsible for maintaining posture and equilibrium of the body.

Question 4: How do we detect the smell of an agarbatti (incense stick)?

Solution: The forebrain is responsible for thinking. It has separate areas that are responsible for our hearing, smelling, sight, etc. The forebrain has regions that collect impulses from the various receptors. When the smell of an incense stick reaches us, our forebrain detects it. Then, the forebrain interprets it & we can detect smell of agarbatti.

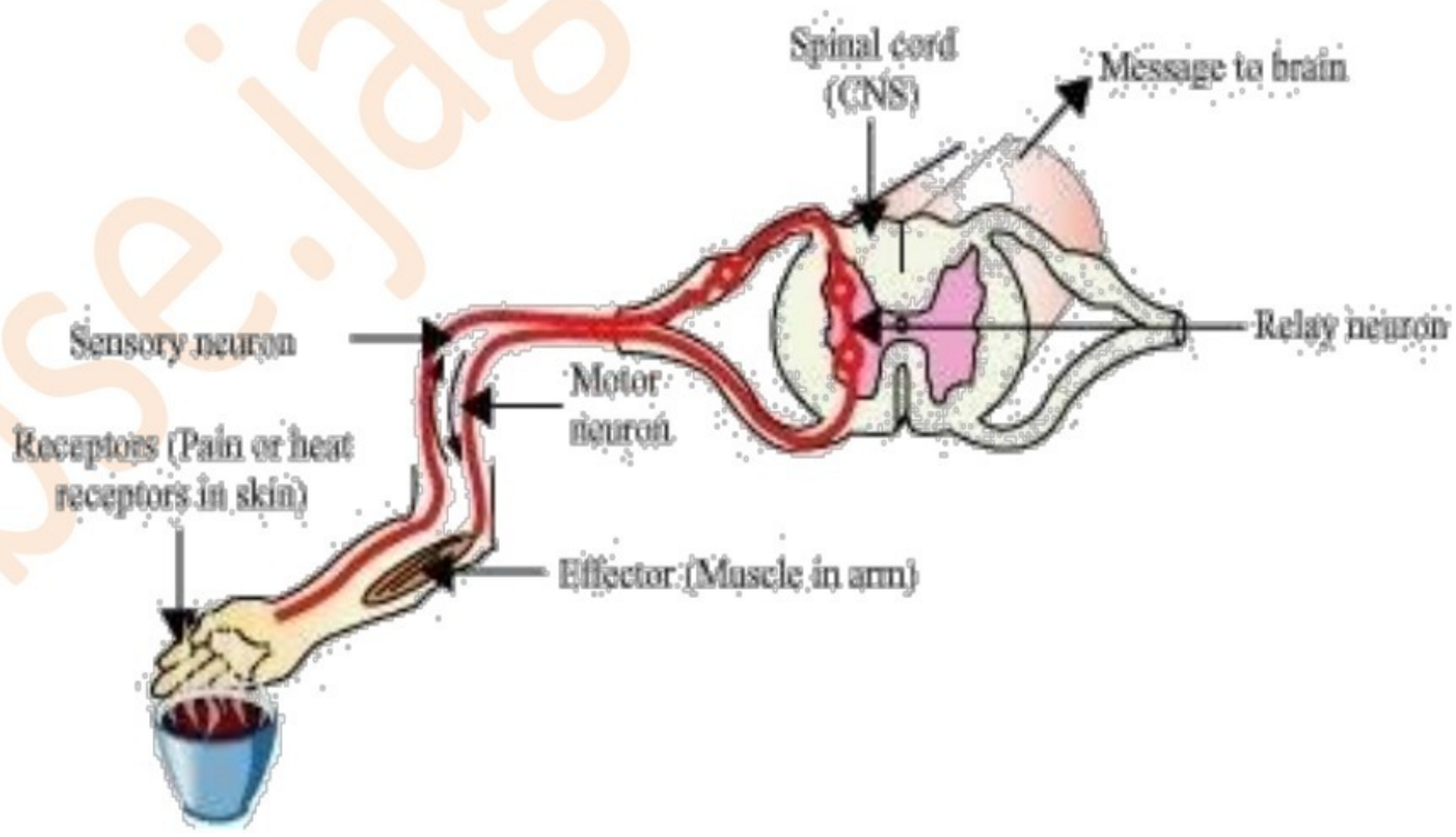
Question 5: What is the role of the brain in reflex action?

Solution: Reflex actions are sudden responses, which do not involve any thinking.

For example, we remove our hand immediately when our hand is touched by any hot thing.

This action takes place without thinking as thinking may take time which would be enough to get us burnt.

The sensory nerves that detect the heat are connected to the nerves that move the muscles of the hand. This whole process is called a reflex arc. The reflex arcs −connections present between the input and output nerves − meet in a bundle in the spinal cord.



Reflex arc: Reflex arcs are formed in the spinal cord and the information reaches the brain.

CBSE Class 10th NCERT Solution: Science

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Question 1: What are plant hormones?

Solution: They are naturally occurring organic substances. They are also known as phytohormones. These are synthesized in one part of the plant body and can be transported to other parts when required.

The five major types of plant hormones are auxins, gibberellins, Cytokinin, abscisic acid, and ethylene.

Question 2: How is the movement of leaves of the sensitive plant different from the movement of a shoot towards light?

Solution: Both movements are different. The movement of leaves of the sensitive plant for example-Mimosa pudica (touch me not) occurs in response to touch. This movement is independent of growth.

On the other hand, the movement of shoot towards light is directional and is growth dependent. This type of movement is known as phototropism

Question 3: Give an example of a plant hormone that promotes growth.

Solution: Auxin is a growth-promoting plant hormone.

Question 4: How do auxins promote the growth of a tendril around a support?

Solution: Auxin helps in cell growth and is synthesized at the shoot tip. When a tendril comes in contact with a support, auxin stimulates faster growth of the cells. It directs growth on the opposite side, so that the tendril forms a coil around the support.

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Question 1: How does chemical coordination take place in animals?

Solution: In animals, chemical coordination takes place with the help of hormones. Hormones are secreted by glands. Endocrine system helps in the regulation of physiological processes, control and coordination through hormones.

Question 2: Why is the use of iodised salt advisable?

Solution: Iodine helps in producing thyroxin hormone by stimulating the thyroid gland. It regulates carbohydrate, fat, and protein metabolism in our body. Deficiency of this hormone results in swelling of neck because of the enlargement of the thyroid gland. This is known as goitre. Therefore, iodised salt is advised.

Question 3: How does our body respond when adrenaline is secreted into the blood?

Solution: In case of any emergency, Adrenalin hormone is secreted by the adrenal glands. It is secreted directly into the blood and is transported to different parts of the body.

When this secretion takes place in large amounts, it speeds up the heartbeat and hence supplies more oxygen to the muscles. The breathing rate also increases due to this. It also increases the blood pressure.

Question 4:

Why are some patients of diabetes treated by giving injections of insulin?

Solution: In Diabetes, the level of sugar in the blood raises. Insulin helps in regulating the blood sugar levels. This hormone is secreted by the pancreas. This is the reason why diabetic patients are treated by giving injections of insulin.

Exercise

Question 1: Which of the following is a plant hormone?

(a) Insulin

(b) Thyroxin

(c) Oestrogen

(d) Cytokinin

Solution: (d) Cytokinin is a plant hormone.

Question 2: The gap between two neurons is called a

(a) Dendrite

(b) Synapse

(c) Axon

(d) Impulse

Solution: (b) The gap between two neurons is called a synapse.

Question 3:

The brain is responsible for

(a) Thinking

(b) Regulating the heart beat.

(c) Balancing the body.

(d) all of the above.

Answer

(d) The brain is responsible for thinking, regulating the heart beat and balancing the body.

Question 4:

What is the function of receptors in our body? Think of situations where receptors do not work properly. What problems are likely to arise?

Answer

Receptors are sensory structures present in whole body.

Functions of receptors: -

They sense the external stimuli such as heat or pain.

They also trigger an impulse in the sensory neuron which sends message to the spinal cord.

When the receptors are damaged, the external stimuli transferring signals to the brain are not felt. For example- in the case of damaged receptors, if we accidentally touch any hot object, then our hands might get burnt as damaged receptors cannot perceive the external stimuli of heat and pain.

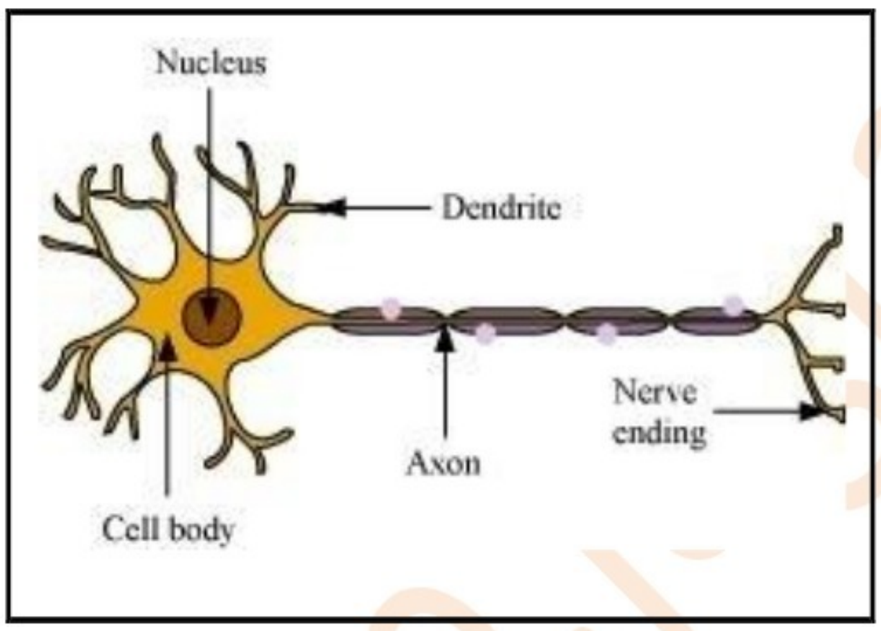
Question 5:

Draw the structure of a neuron and explain its function.

Answer

Neurons are the functional units of the nervous system.

the three main parts of a neuron are axon, dendrite, and cell body.



Functions of the three parts of a neuron:

Axon: It conducts messages away from the cell body.

Dendrite: It receives information from axon of another cell and conducts the messages towards the cell body.

Cell body: It contains nucleus, mitochondria, and other organelles. It is mainly concerned with the maintenance and growth.

Question 6:

How does phototropism occur in plants?

Answer

Phototropism is the growth movement in plants in response to light stimulus.

The shoots show positive phototropism and the roots show negative phototropism. It means that the shoots bend towards the source of light whereas the roots bend away from the light source.

Example-

(a) The flower head of sunflower is positively phototropic

(b) The ovary stalk of groundnut is positively phototropic before fertilization and becomes negatively phototropic after fertilization, so that the fruit is formed underground.

Question 7:

Which signals will get disrupted in case of a spinal cord injury?

Answer

As we know, the reflex arc connections between the input and output nerves meet in the spinal cord. Nerves from all over the body meet in the spinal cord on their way to the brain. If any injury happens with the spinal cord, the signals coming from the nerves as well as the signals coming to the receptors will be disrupted.

Question 8:

How does chemical coordination occur in plants?

Answer

In animals, control and coordination happens with the help of nervous system. Plants do not have a nervous system.

Plants respond to stimuli by showing movements. Various activities like growth, development, and responses to the environment in plants is controlled and coordinated by a hormones. These hormones are produced in one part of the plant body and are translocated to other needy parts. For example, a hormone produced in roots is translocated to other parts when required. The five major types of phytohormone are auxins, gibberellins, cytokinins, abscisic acid, and ethylene

Question 9:

What is the need for a system of control and coordination in an organism?

Answer

Coordination is the maintenance of the body functions in response to changes in the body. It takes place by working together of various integrated body systems. All the movements that occur in response to stimuli are coordinated and controlled. In animals, the control and coordination movements are provided by nervous and muscular systems. The nervous system sends messages to and away from the brain. The spinal cord plays an important role in the relay of messages. In the absence of this system of control and coordination, our body will not be able to function properly.

Question 10:

How are involuntary actions and reflex actions different from each other?

Answer

Involuntary actions cannot be consciously controlled. For example, we cannot consciously control the digestion of food. These actions are directly under the control of the brain.

On the other hand, the reflex actions like closing of eyes immediately when bright light approaches our eyes show sudden response. It does not involve any thinking. Thus, we can say that, the reflex actions are not under the control of brain.

Question 11:

Compare and contrast nervous and hormonal mechanisms for control and coordination in animals.

Answer

	Nervous system mechanism		Hormonal system mechanism
1.	Here, information is conveyed in the form of electric impulse.	1.	Here, information is conveyed in the form of chemical messengers.
2.	The axons and dendrites transmit the information through a coordinated effort.	2.	The information is transmitted or transported through blood.
3.	The flow of information is rapid and the response is quick.	3.	The information travels slowly and the response is slow.
4.	Its effects are short	4.	It has prolonged effects.

Question 12:

What is the difference between the manner in which movement takes place in a sensitive plant and the movement in our legs?

Answer

	Movement in sensitive plants		Movement in our legs
1.	In this, movement occurs in response to touch.	1.	It is an example of voluntary actions.

2.	For this movement, the information is transmitted from cell to cell by electro-chemical signals as plants do not have any specialised tissue for conduction of impulses.	2.	The signal or messages for these actions are passed to the brain and hence are consciously controlled.
3.	For this movement to occur, the plant cells change shape by changing the amount of water in them.	3.	In animal muscle cells, some proteins are found which allow the movement to occur.