

Chapter – 6

Control and Coordination

Questions:

Q. 1 What is the difference between a reflex action and walking?

Answer:

reflex action	Walking
It is rapid, automatic response to a stimulus.	It is a voluntary action
It is an involuntary action	It is under the control of an organism.
It is under the control of the Peripheral Nervous (System Spinal chord)	It is under the control of the Central Nervous System(Brain)

Q. 2 What happens at the synapse between two neurons?

Answer: Transmission of nerve impulses between two neurons takes place through the synapse. Axon bulb releases specialized chemicals called as neurotransmitters like acetylcholine which help in chemical transfer of information through synapses into the dendrites of another neuron which receives the information and passes on further in a similar manner. These chemical messengers pass through synapses and start an electric impulse

Q. 3 Which part of the brain maintains posture and equilibrium of the body?

Answer: Cerebellum in the Hind Brain maintains posture and equilibrium of the body. Hind brain is divided into Pons, Cerebellum and Medulla.

Q. 4 How do we detect the smell of an aggarbatti (incense stick)?

Answer: The temporal lobes of the brain are concerned with smell, hearing and taste. When an incense stick burns, it produces fumes of

pleasant smells. The forebrain has regions that receive impulses from various receptor organs. So when the smell of aggarbatti reaches our olfactory receptors (in nose), the receptors send electrical or chemical impulses via neurons to the forebrain. The forebrain thus detects the smell of an aggarbatti.

Q. 5 What is the role of the brain in reflex action?

Answer: Brain has no role in case of reflex action as it is an extremely quick action which does not involve any thinking by the brain. In case of reflex action the stimulus is received by the spinal cord and the only role that brain plays is to register the information that the reflex action has taken place.

Questions:

Q.1 What are plant hormones?

Answer:

- Plant hormones (also called phytohormones) are small, signal molecules which are responsible for regulating plant cell processes.
- There are five major hormones which are
 - auxin
 - cytokinin
 - gibberellin
 - abscisic acid
 - ethylene.
- Each hormone differs in its effects.
- Auxins, gibberellins, and cytokinins act as growth stimulators.
 - Abscisic acid and ethylene act as growth inhibitors.

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

Answer: The movement of leaves of sensitive plant are nastic movements that are independent of any stimulus, be it light.

Movement of a shoot towards light is due to phototropism which is a plant's growth response to light source. The movement of shoot towards light is positive and the shoots are said to be positively phototropic. If the plant part grows away from light, it is known as negatively phototropic.

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

Answer: Auxins and Gibberellin are plant hormones that promote growth.

- Gibberellin controls stem elongation and also germination.
- Auxins bring about elongation of cells in shoot and thus are a growth regulator.

Q. 4 How do auxins promote the growth of a tendril around a support?

Answer:

- Auxin is one of the major plant growth hormones.
- In tendrils, auxin is present in the tips.
- When a tendril comes in contact with a support, auxin stimulates faster cell growth on the opposite side.
- This makes the tendril curve and bend towards the support.
- This curving tendril can then encircle the support and sling around it.

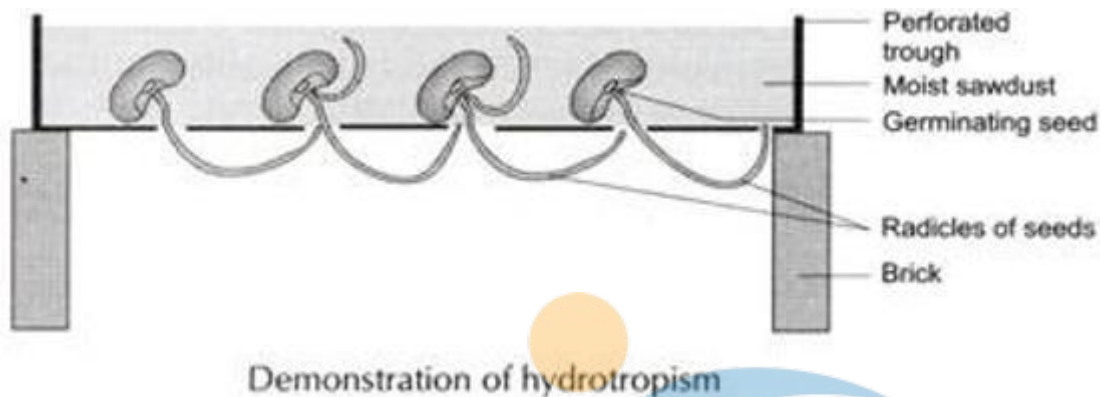
Q. 5 Design an experiment to demonstrate hydrotropism.

Answer: Hydrotropism is the growth of roots in response to the unilateral stimulus of water. Roots are positively hydrotropic because they bend towards the source of water.

Experiment to demonstrate hydrotropism-

Germinate few seeds in moist dust in the ground. After some time you will observe that radicles start coming out of the ground but they start bending and again enter the moist saw dust. This happens because roots

are positively hydrotropic. They bend towards the source of water i.e. moist sawdust in this case.



Questions:

Q.1 How does the chemical coordination take place in animals?

Answer: Chemical coordination takes place in animals through Hormones. Hormones are chemical messengers released by the endocrine system that move through the blood stream and can reach every cell in the body. They help to maintain a constant environment inside the body, and control cellular activities by entering the cell and influencing its activities by sending commands to chemical messengers within cell.

Q.2 Why is the use of iodized salt advisable?

Answer: Lack of iodine in diet leads to deficiency of thyroxin hormone which results in a condition known as simple goitre. It is a swelling of the thyroid gland without any over secretion sign of thyroid hormone. If the iodine deficiency is moderate, it leads to high concentrations of Thyroid Stimulating Hormone which leads to swelling of the glands. For these reasons it is advisable to take iodine in diet because it stimulates the thyroid gland to produce thyroxin hormone and thus prevents from such disorders.

Q. 3 How does our body respond when adrenaline is secreted into the blood?

Answer: Adrenaline is a hormone secreted by the adrenal glands in case of flight situation/ emergency. When adrenaline is secreted into the blood, it-

- Speeds up the heartbeat, thus providing more oxygen to the limbs.
- Increases the rate of blood circulation thus resulting in an increase in blood pressure.
- Increases the blood supply to limbs and face.
- Stimulates the liver to put more glucose into the blood.

All these characteristics that occur on adrenaline secretion prepare the organism for flight from danger.

Q. 4 Why are some patients of diabetes treated by giving injections of insulin?

Answer: A person suffers from diabetes when his/her body fails to produce adequate amount of Insulin.

Insulin is a hormone secreted by pancreas that helps in regulating the blood glucose level. If insulin is not produced in sufficient amount in blood, the level of glucose in the blood increases which leads to various serious conditions like retinopathy, blindness, fatigue, excessive urination and other serious complications too. So in order to maintain the insulin level in the blood of a diabetic person, insulin injections are administered artificially into them.

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Exercise

Questions:

Q.1 Which of the following is a plant hormone?

- A. Insulin
- B. Thyroxin
- C. Oestrogen
- D. Cytokinin

Answer: Cytokinins are plant growth hormones that Control cellular division in root and shoot, also called as antiaging hormones.

Q. 2 The gap between two neurons is called a;

- A. Dendrite
- B. Synapse
- C. Axon
- D. Impulse

Answer: Synapse is the gap between two neurons that passes chemical or electrical signals from one neuron to another.

Q. 3 The brain is responsible for:

- A. Thinking
- B. Regulating the heart beat
- C. Balancing the body
- D. All of the above

Answer: Brain is divided into many parts- cerebrum, cerebellum, hypothalamus, medulla oblongata, pons, Cerebrum is concerned with thinking. Midbrain, pons and medulla are concerned with regulating the heartbeat. Cerebellum helps in balancing the body.

Q. 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?

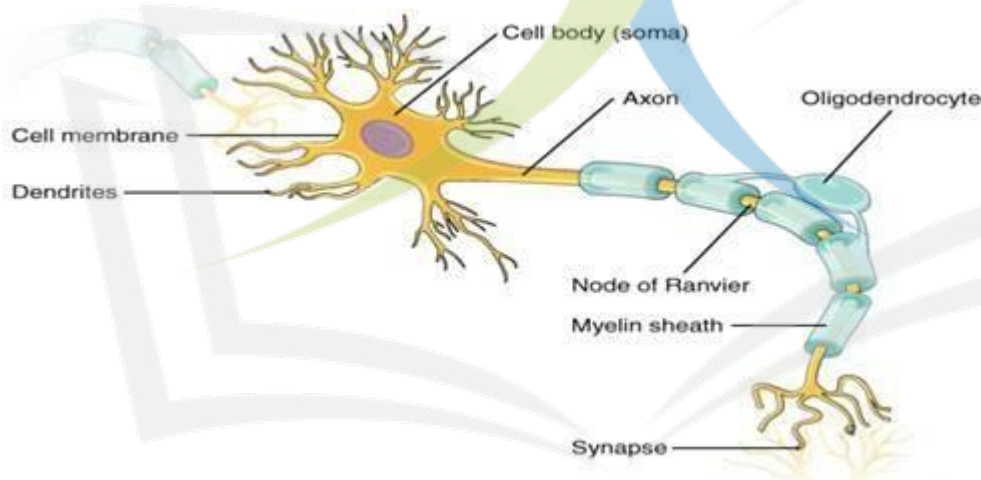
Answer: A receptor is a protein molecule that receives chemical signal from outside and interprets them. On receiving these signals the receptors bring about cellular responses. There are receptors in nose, tongue, ear, eye etc.

If receptors do not work properly then the information sent by the chemical signals will not be interpreted and perceived. Suppose the

receptors found on our tongue, gustatory receptors do not work, an organism will not be able to perceive the taste of things one puts on tongue or eats. If the receptor in eye, say rod, does not work properly then an organism will not be able to perceive vision at night because rods function in less intense lights; so if rods will not function the person will not be able to perceive vision at night. Similarly, If in a situation the receptors in nose, i.e. the olfactory receptors fail to function properly, then the signals sent to brain regarding any smell will not be perceived and an organism will not be able to smell.

Q. 5 Draw the structure of a neuron and explain its function.

Answer:



A neuron consists of a cell body which gives off a variable number of processes. They give off several short branching processes called dendrites and one longer process known as axon.

Neurons transmit chemical and electric signals in the brain. The ends of axons possess bulb like structures which have neurotransmitters in them, these bulbs connect with the dendrite of another neuron and form synapses. These neurotransmitters transmit signals from one end of neuron to the dendrites of another neuron, thus conducting the chemical impulse. Electrical signals also occur in neurons but they are comparatively slower.

Q. 6 How does phototropism occur in plants?

Answer: Phototropism are curvature movements that occur when a plant is provided with artificial, natural light just from one direction. Plant parts that show a bending towards the source of light are said to be positively phototropic, whereas plant parts that bend/ grow away from light source are said to be negatively phototropic.

This curvature bending of parts usually stem is due to unequal distribution of auxin under the influence of light. Auxins accumulate on side away from light. So wherever auxin concentration will be high, the stem will promote growth on that side.

Q. 7 Which signals will get disrupted in case of a spinal cord injury?

Answer: In case of a spinal cord injury, the signals coming from nerves and signals coming to the receptors will be disrupted, also disturbing the reflex and involuntary actions.

Q. 8 How does chemical coordination occurs in plant?

Answer: Chemical coordination occurs in plant with plant hormones. Plant hormones are synthesized at places away from where they act and diffuse to the area of action. Different plant hormones help to coordinate growth and development. For example, auxins and gibberellins. Gibberellins help in growth of the stem. Abscisic acid, another plant hormone, inhibits growth in plants.

Q. 9 What is the need for a system of control and coordination in an organism?

Answer: There are various organs and organ systems in an organism.

To allow proper functioning and survival of an organism they need to be coordinated and controlled.

In human beings nervous system and endocrine system work together to control and coordination.

Q. 10 How are involuntary actions and reflex actions different from each other?

Answer:

INVOLUNTARY ACTIONS	REFLEX ACTION
They happen in involuntary organs.	They happen in a voluntary organ and are regulated by spinal cord.
These actions are a part of daily routine.	They are in response to sudden stimulus of danger.
Eg- beating of heart.	Eg- decrease in size of pupil on stepping out in light.

Q.11 Compare and contrast nervous and hormonal mechanisms for control and coordination in animals.

Ans:

Nervous System Mechanism	Hormonal System Mechanism
It is consist of nerve impulses between PNS, CNS and Brain.	It consists of endocrine system which secretes hormones directly into blood.
The axons and dendrites transmit the information through a coordinated effort.	The information is transmitted or transported through blood.
The flow of information is rapid and the response is quick.	The information travels slowly and the response is slow.
Nerve impulses are not specific in their action.	Each hormone has specific actions.
Effects are short lived.	It has prolonged effects.

Q.12 What is the difference between the manner in which movement takes place in a sensitive plant and the movement in our legs?

Ans:

Movement in sensitive plants	Movement in our legs
The movement in a sensitive plant is a response to stimulus(touch) which is a involuntary action.	Movement in our legs is a voluntary action.
No special tissue is there for the transfer of information	A complete system CNS and PNS is there for the information exchange.
Plant cells do not have specialised protein for movements.	Animal cells have specialised protein which help muscles to contract.