

Board –CBSE

Class –10<sup>th</sup>

Topic – Control and Coordination

1. Why is it advised to use iodized salt in our diet?

**Ans.** Iodine stimulates the thyroid gland to produce the thyroxin hormone. Deficiency of this hormone results in the enlargement of the thyroid gland. This can lead to goitre.

2. State how the concentration of Auxin stimulates the cells to grow longer on the side of the shoot which is away from the light?

**Ans.** When light falls on the side of the shoot Auxin diffuses towards the shady side of the shoot. This concentration of the Auxin stimulates the cells to grow longer on the side of the shoot which is away from light. Thus plant appears to bend towards the light.

3. What is a synapse? In a neuron cell how is an electrical impulse created and what is the role of synapse in this context?

**Ans.** A synapse is a gap between the two neurons. Here the axon terminal of one neuron is in close proximity to the dendrite of the second neuron. When a nerve impulse reaches the knob-like nerve ending of an axon, a tiny amount of a chemical substance is released in the synapse. This chemical substance is called the neurotransmitter. At the synapse, the electrical signals are converted into chemicals, which can easily cross over the gap and pass on to the next neurons where it again converted into electrical signals.

4. (i) Name the hormones that are released in human males and females when they reach puberty.  
(ii) Name a gland associated with the brain. Which problem is caused due to the deficiency of the hormone released by this gland?

**Ans.** (i) Testes in males produce the hormone testosterone. Ovaries in females produce the hormone oestrogen.

(ii) Pituitary gland present in the brain is responsible for body growth, development of bones and muscles (if less-dwarfism).

5. Write one example of each of the following tropic movements:

(i) Positive phototropism (ii) Negative phototropism (iii) Positive geotropism (iv) Negative geotropism (v) Hydrotropism (vi) Chemotropism

**Ans.** (i) Positive phototropism: shoots growing towards the light.

(ii) Negative phototropism: roots growing away from light towards the ground.

(iii) Positive geotropism: growth of roots towards earth due to the gravitational pull of the earth.

(iv) Negative geotropism: shoots growing away from earth

(v) Hydrotropism: roots growing towards the source of water

(vi) Chemotropism: growth of pollen tubes towards the ovules.

6. a) Name the hormone which is released into the blood when its sugar level rises. Name the organ which produces this hormone and its effect on blood sugar level. Also, mention the digestive enzymes secreted by this organ with one function of each.

(b) Explain the need for Chemical communication in multicellular organisms.

**Ans.** (a) Insulin is a hormone produced by the beta-cells of the pancreas that regulates glucose levels in the blood. The pancreas decreases blood glucose levels by producing insulin and glucagon to increase blood glucose in the blood. It also – produces a digestive enzyme (pancreatic amylase converts starch into maltose).

(b) Cell-to-cell signaling is a critical component of coordinating cellular activities. Through this communication, messages are carried from signaling cells to receiving cells, also known as target cells. This signaling occurs with proteins and other types of signaling molecules. Other things which happen in our body due to cell communication are – growth and development, cellular reproduction, tissue repair, sensing pain, etc.

7. (a) Explain any three directional movements in plants.

(b) How the brain and spinal cord are protected in humans?

(c) Name the master gland present in the brain.

**Ans.** (a) Stimuli are responsible for the movement of the plant parts towards or away from it. This movement is called as Tropic Movement. Phototropism: movement of the plant towards or away from the light. Geotropism: movement of plant parts towards the earth or away from it. Hydrotropism: movement of plant parts towards or away from any source of water.

(b) Both the brain and the spinal cord are protected by bone: the brain by the bones of the skull (cranium) and the spinal cord is protected by made up of a set of ring-shaped bones called

vertebrae (vertebral column). They are both cushioned by layers of membranes called meninges as well as a special fluid called cerebrospinal fluid. This fluid helps to protect the nerve tissue to keep it healthy and remove waste products.

(c) Pituitary gland present in the brain is known as the master gland.

8. List in tabular form three differences between nervous control and chemical control.

**Ans.**

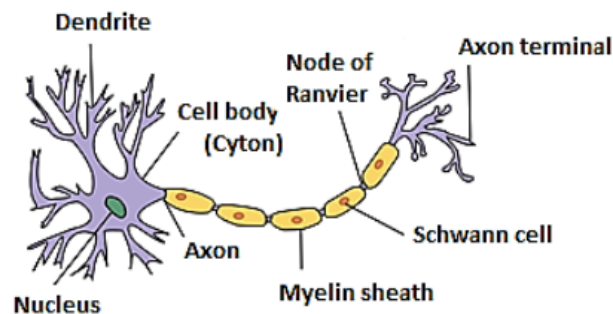
Nervous Control	Chemical control
(i) Formed a collection of neuron cells.	(i) Formed of a set of glands.
(ii) Electrochemical pulses are the mean of signal transmission.	(ii) Chemicals called hormones are the mean of signal transmission.
(iii) Signal transmission is fast, but the functions are not prolonged.	(iii) Signal transmission is slow, but the functions are long-lasting.
(iv) The cells are interconnected and the whole system is continuous.	(iv) The organs of the whole system are not physically connected yet those are discrete.
(v) Use the neurons to transmit the signal.	(v) Use the circulatory system to transmit.

9. What is the function of receptors in our body?

**Ans.** Receptors are usually located in our sense organs, such as the inner ear, the nose, the tongue, and so on, that sense the stimulus. So gustatory receptors will detect taste while olfactory receptors will detect the smell.

10. Draw the structural and functional unit of the nervous system.

**Ans.** Neurons are electrically excitable cells in the nervous system that function to process and transmit information. Invertebrate animals, neurons are the core components of the brain, spinal cord, and peripheral nerves



**11.** How does chemical coordination occur in plants?

**Ans.** It has been found that the growth of plants is regulated by certain chemical substances which are synthesized by the plants in very small amounts. These are known as plant hormones or phytohormones. They are organic substances that either promote or inhibit growth. A phytohormone can be defined as a chemical substance that is produced naturally in plants and are capable of translocation and regulating one or more physiological processes when present in low concentration. The main categories of plant hormones are: Auxin Gibberellins Cytokinin Ethylene Abscisic acid Auxin and Gibberellins stimulate cell elongations, cytokinin stimulate cell division ethylene promotes transverse or isodiametric growth and Abscisic acid is a growth inhibitor

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

**Ans.** Co-ordination in this sense refers to the regulation or control of body activity. Plants need very little in the way of a control system. Since growth and reproduction are about the only things that are regulated, a rapid control system is not required and hormonal control is all they possess. Animals are continually moving through new environments that may pose all types of changes and threatening situations to the organism. This requires the rapid and precise control of the nervous system. Hormones regulate slower activities, such as growth, development, and reproduction.

**13.** How are involuntary actions and reflex actions different from each other?

**Ans.** All reflex actions are involuntary in nature but all involuntary actions are not reflexes as the beating of the heart is an involuntary action but is not reflex action.

Reflex actions are very quick but all involuntary actions may not be very fast as in heart beating.

A reflex action may involve any muscle or a gland as we withdraw our hand on touching a hot object but all involuntary actions involve only smooth i.e., involuntary or cardiac muscles.

Reflex actions are at the level of the spinal cord whereas involuntary actions generally involve the brain too.

Nerves and the autonomous nervous system can increase or decrease the rate of involuntary actions but reflex actions can be controlled by great will only and are not usually controllable.

Reflex actions are done to meet emergencies whereas any action may or may not be for just meeting an emergency but may be a critical life process as circulation of blood, swallowing of food, movement of food in food pipe, etc.

**14.** What is chemotropism? Give one example. Name any two plant hormones and mention their functions.

**Ans.** Chemotropism is the movement of a part of the plant in response to a chemical stimulus. It can be positive chemotropism or negative chemotropism. Ex: The growth of pollen tube towards a chemical which is produced by an ovule during the process of fertilization in a flower. Two plant hormones with their functions are as follows: Auxin promotes cell elongation, root formation, cell division, respiration, and other physiological processes like protein synthesis, etc. Gibberellins stimulate stem elongation, seed germination, and flowering.

**15.** State the functions of any three of the structural and functional units of the nervous system.

**Ans.** The structural and functional unit of the nervous system, i.e. neurons with their functions is as

– Cell body: Stimulus received from dendrite is changed into an impulse in the cyton.

Dendrites: They receive sensations or stimuli, which may be physical or chemical.

Axon: It conducts impulses away from the cell body.

**16.** What is 'hydrotropism'? Describe an experiment to demonstrate 'hydrotropism'.

**Ans.** 'Hydrotropism' is the directional growth of a plant part in response to water. For example, roots show hydrotropism as they grow towards the water in the soil and are positively hydrotropic.

An experiment to demonstrate hydrotropism is as follows:

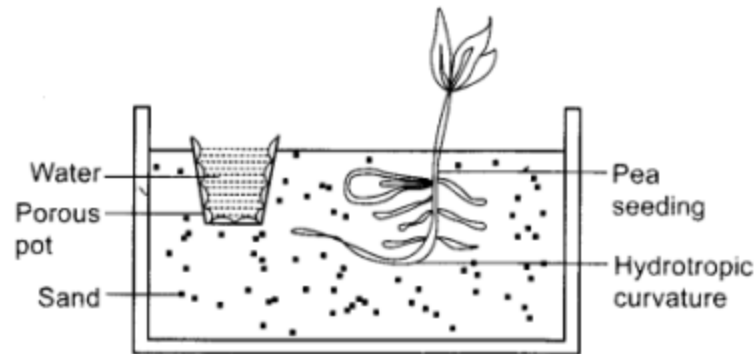
A porous pot filled with water is taken and inserted in a tub filled with dry sand.

A freshly germinated pea seedling is sowed in the sand.

As water is not available in sand, the root growth will bend towards the porous pot filled with water.

A hydrotropic curvature of the root is observed as it grows towards the water.

This bending of the root shows the movement in response towards the water.



**17.** What are 'hormones'? State one function of each of the following hormones:

(i) Thyroxine (ii) Insulin

**Ans.** Hormones are chemical substances that coordinate and control the activities of living organisms and also their growth. The term hormone was introduced by Bayliss and Starling.

The function of Thyroxine: This hormone regulates the metabolism of carbohydrates and fats.

The function of Insulin: This hormone helps in regulating sugar levels in the blood.

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

**Ans.** Receptors are present in all parts of the body for example in the skin, eye, nose tongue, etc. They detect the signals and then send them to the brain in the form of electrical signals. If these receptors are damaged, then they will not detect the input which leads to harm for our body in a dangerous situation.

**19.** Mention the function of the hind-brain in humans.

**Ans.** The hindbrain controls respiration, cardio-vascular reflexes, and gastric secretions. It also modulates the motor commands initiated by the cerebrum

**20.** Mention the function of the adrenaline hormone.

**Ans.** Adrenaline hormone is released into the blood from the adrenal gland during stimulation of the nervous system on seeing any adverse situation of fight or fright, it:

Increases blood pressure.

Increases heartbeat rate.

Increases breathing rate.

Diverts blood to essential organs including the heart, brain, and skeletal muscles by dilating their blood vessels and constricting those of less essential organs, such as the skin and digestive system

**21.** Name and explain the function of the hormone secreted by the pituitary gland in humans.

**Ans.** Hormones secreted by the pituitary gland along with their functions are:

Growth hormone: It regulates the growth and development of bones and muscles.

Trophic hormone: It regulates the secretion of hormones from other endocrine glands.

Prolactin hormone: It regulates the function of mammary glands in females.

Vasopressin hormone: It regulates water and electrolyte balance in the body,

☑ Oxytocin hormone: It regulates the ejection of milk during lactation.

**22.** What is a reflex action? Describe the steps involved in a reflex action.

**Ans.** Reflex action: It is defined as an unconscious, automatic and involuntary response of effectors, i.e. muscles and glands, to a stimulus, which is monitored through the spinal cord.

Mechanism of reflex action: It involves the following steps:

Receptor organ like skin perceives the stimulus and activate a sensory nerve impulse.

The sensory organ carries the message in the form of the sensory impulse to the spinal cord.

The spinal cord acts as a modulator: The neurons of the spinal cord transmit the sensory nerve impulse to the motor neuron.

Motor never conducts these impulses to the effectors like leg muscles which respond by pulling back the organ away from the harmful stimulus.

**23.** (a) Name the two main constituents of the Central Nervous System in human beings.

(b) What is the need for a system of control and coordination in human beings?

**Ans.** (a) The two main constituents of the Central Nervous System in human beings are the brain and the spinal cord.

(b) A living being does not live in isolation. It has to constantly interact with its external environment and has to respond properly for its survival. For example; when a hungry lion spots a deer, the lion has to quickly make a move so that it can have its food. On the other hand, the deer needs to quickly make a move to run for its life. The responses which a living being makes in relation to external stimuli are controlled and coordinated by a system; especially in complex

animals. So, control and coordination. is essential in maintaining a state of stability and a steady-state between the internal conditions of an organism and the external environment