



## Class 10 Science Notes Chapter 7 Control and Coordination

### Introduction

The human body is a complex machine performing tons of functions and processes to maintain and sustain life. Explore how the body controls its movements and coordinates its actions with other parts of the body and the environment by exploring notes for Class 10 Chapter 7 Control and Coordination.

### The Nervous System

#### Movement in Organisms

The ability of organisms to move certain body parts is **movement**.

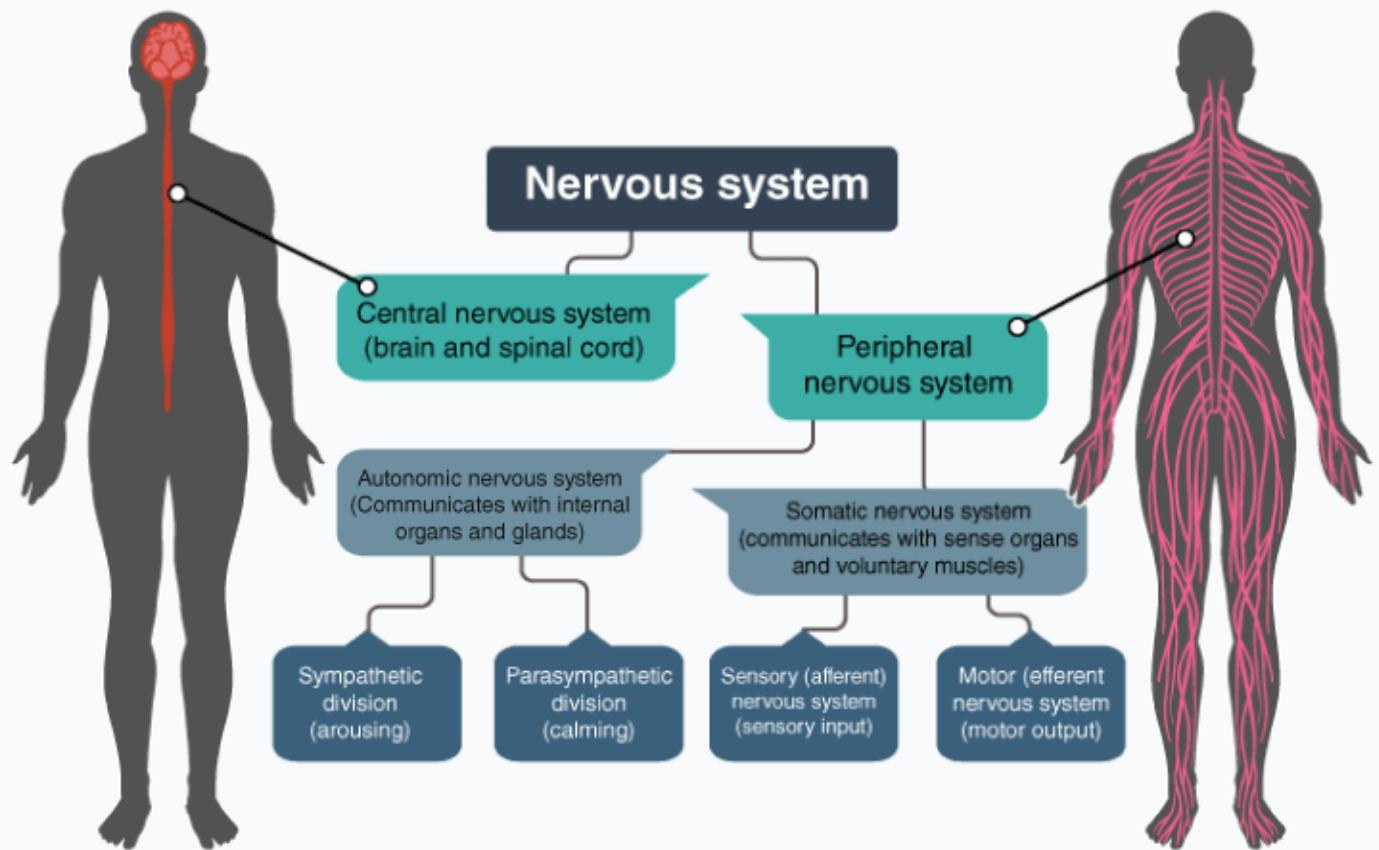
When they move from one place to another, it is called **locomotion**.

Organisms show movements in response to stimuli.

#### Introduction to Control & Coordination

- Organisms move in response to various kinds of stimuli like light, heat, nutrients/food, etc.
- All the activities in animals are controlled and coordinated by the nervous and endocrine systems.
- Hormones are chemical messengers which assist the nervous system in carrying out various functions. They are secreted by endocrine glands.
- Hormones in plants coordinate the movements.

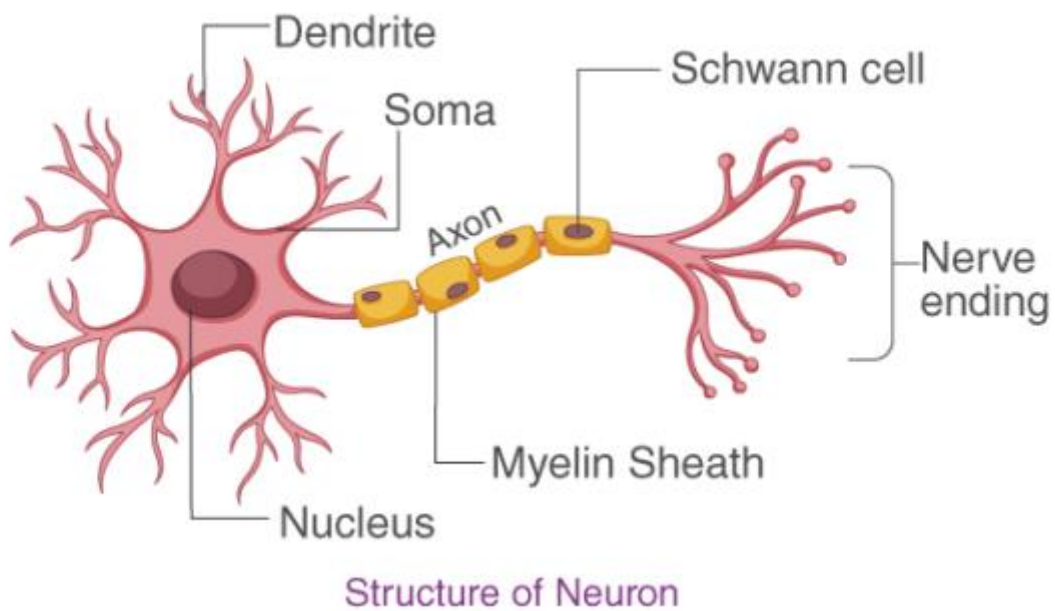
### The Nervous System



## Neuron

Neuron is the structural and functional unit of the nervous system.

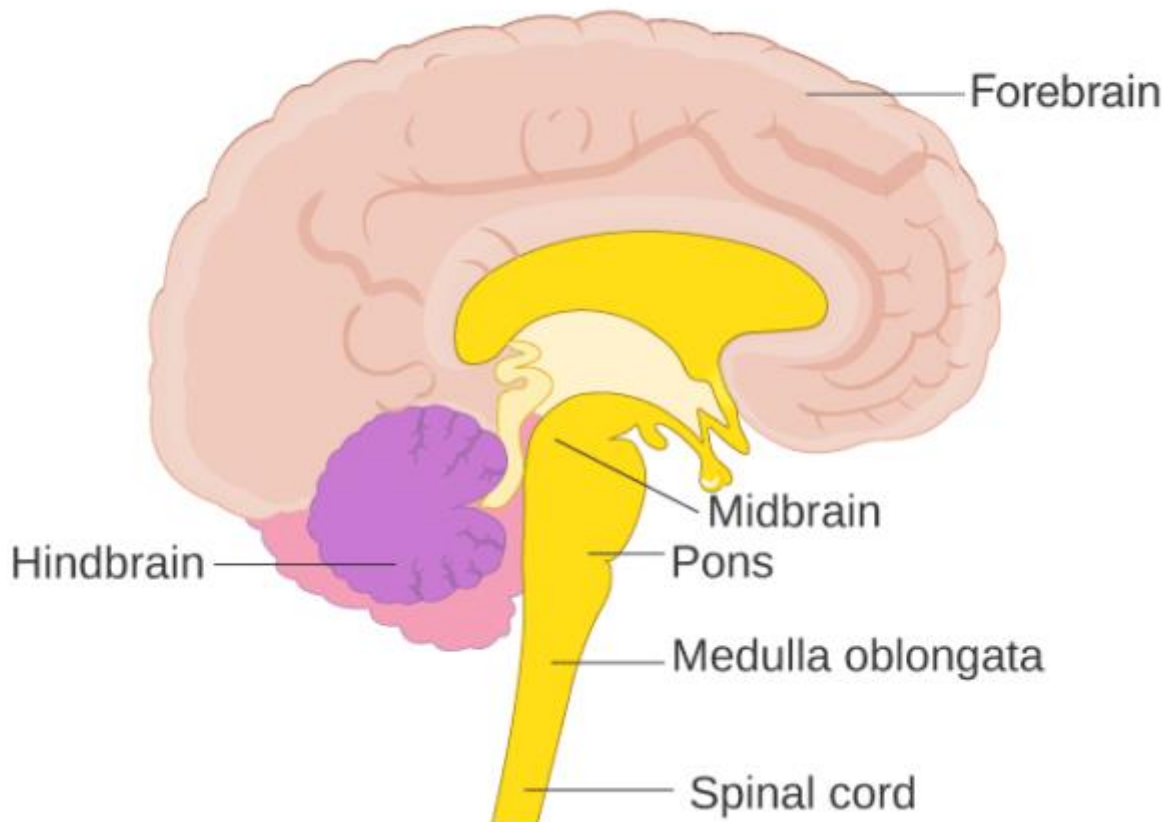
- Each neuron has three main parts: dendrites, cyton/soma/cell body and axon.
- Dendrites receive impulses from other neurons.
- Cyton/soma processes the impulse.
- Axon transmits the impulse, either to another neuron or to muscles/glands, etc.
- Axon may be myelinated or non-myelinated.
- The impulse transmission is faster in myelinated [neurons](#).



## Central Nervous System

The central nervous system (CNS) is made up of the brain and the spinal cord. The functions of different parts of the brain are:

- The cerebrum is responsible for reasoning, logic, emotions, speech, memory, visual processing, recognition of auditory and taste stimuli, etc.
- Cerebellum regulates and coordinates body movements, posture and balance.
- Pons relays signals from the hindbrain to the forebrain.
- Medulla Oblongata controls all involuntary movements like vomiting, sneezing, yawning, heartbeat, breathing, blood pressure, etc.
- Medulla oblongata continues as the spinal cord, which runs through the vertebral column and it controls reflex actions.



## Peripheral Nervous System

- The nerves coming out from the brain and the spinal cord constitute the peripheral nervous system (PNS).
- There are 12 cranial nerves and 31 spinal nerves in humans.

## Somatic Nervous System

- It forms a part of the PNS.
- The nerves of PNS that control the voluntary actions of the body form the somatic nervous system.

## Autonomic Nervous System

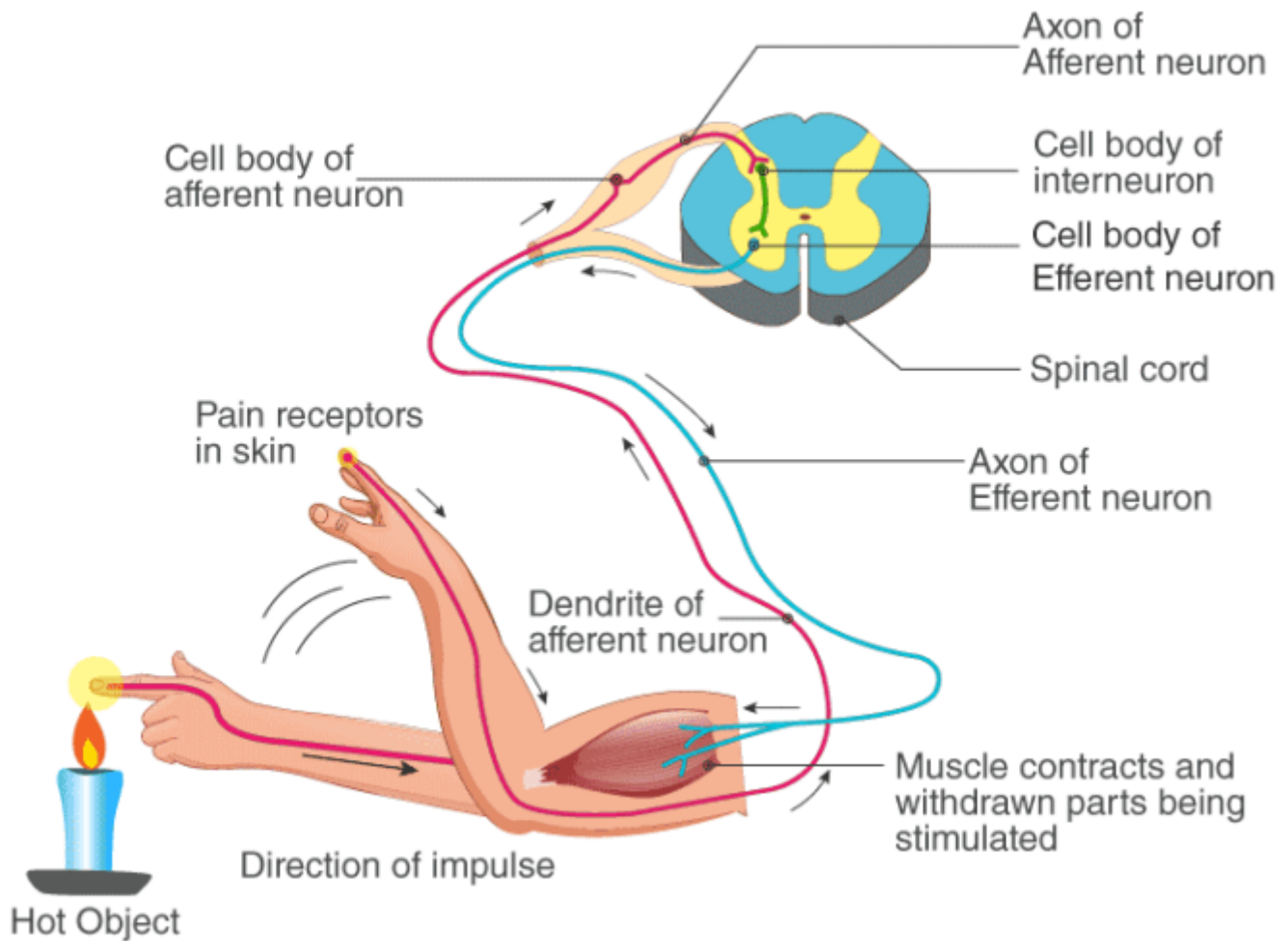
- All the nerves of the PNS that control the involuntary actions in the body form the autonomic nervous system. E.g. respiration, heart rate, blood pressure, digestion, etc., are regulated by the autonomic nervous system.
- Two divisions of the autonomic nervous system are the sympathetic and parasympathetic nervous systems.
- The sympathetic nervous system prepares the body for intense physical activity and is often referred to as the fight-or-flight response, while the parasympathetic nervous system has almost the exact opposite effect and relaxes the body and inhibits or slows many high-energy functions.

## Reflex Action

Reflex action is a sudden, involuntary reaction of the body in response to stimuli.

## Reflex Arc

- It is the path followed by an electrical impulse during a reflex action.
- The impulse travels from the receptor organ to the spinal cord/brain. It is processed there, and the information is brought back to the concerned muscle to carry out the action.
- Thus, the receptor organ, sensory/afferent neuron, interneuron, motor/efferent neuron and effector organ are the components of a reflex arc.



## Protection of CNS

The brain is protected by 3 main layers –

- The bony skull (cranium)
- The cerebrospinal fluid
- The meninges (Dura mater, Arachnoid and Pia mater).

**For more information on Brain, watch the below video**

# Plant Hormones and Movements

## Plant Hormones

Control and coordination in plants are carried out by hormones.

Plant Hormone	Function
Auxin	Helps in the growth of plant tissues
Cytokinin	Promotes cell division, delays ageing of cells
Gibberellins	Helps in the growth of stems, initiates seed germination, promotes flowering, cell division and seed growth after germination
Abscisic acid	Inhibits growth and causes wilting of leaves, promotes dormancy of buds and seeds
Ethylene	This is a gaseous hormone which causes the ripening of fruits

## Growth Independent Movements

The movements which are not growth related are called nastic movements. These movements occur in response to environmental stimuli but the direction of response is not dependent on the direction of the stimulus.

- The movement in the touch-me-not plant is thigmonastic movement (movement in response to touch).



## Growth-Related Movements in Plants

The movements which are growth related are called tropic movements. These movements occur in response to environmental stimuli and the direction of the response is dependent on the direction of the stimulus.

**For more information on Tropic Movements in Plants, watch the below video**

Examples:

- Phototropic movement (light-dependent)
- Geotropic movement (gravity-dependent)
- Chemotropic movement (chemical-dependent)
- Hydrotropic movement (water-dependent)
- Thigmotropic movement (touch dependent)

## Geotropism

Movement of plant parts in response to earth's gravitational force is known as geotropism/gravitropism.

- Towards gravity – positive geotropism
- Away from gravity – negative geotropism
- The root grows towards gravity, and the shoot grows away from gravity



## Phototropism

Movement of plant parts in response to light is known as phototropism.

- Towards light – positive phototropism.
- Away from light – negative phototropism.
- Stems move towards the light, and roots move away from the light.

## Hydrotropism

Movement of plant parts in response to water or moisture.

- Towards water – positive hydrotropism.
- Away from water – negative hydrotropism.
- Again, root movement in search of water is positive hydrotropism.
- E.g. movement of roots towards high humidity level.



# HYDROTROPISM



## Chemotropism

Movement of plant parts in response to chemical stimuli is known as chemotropism.

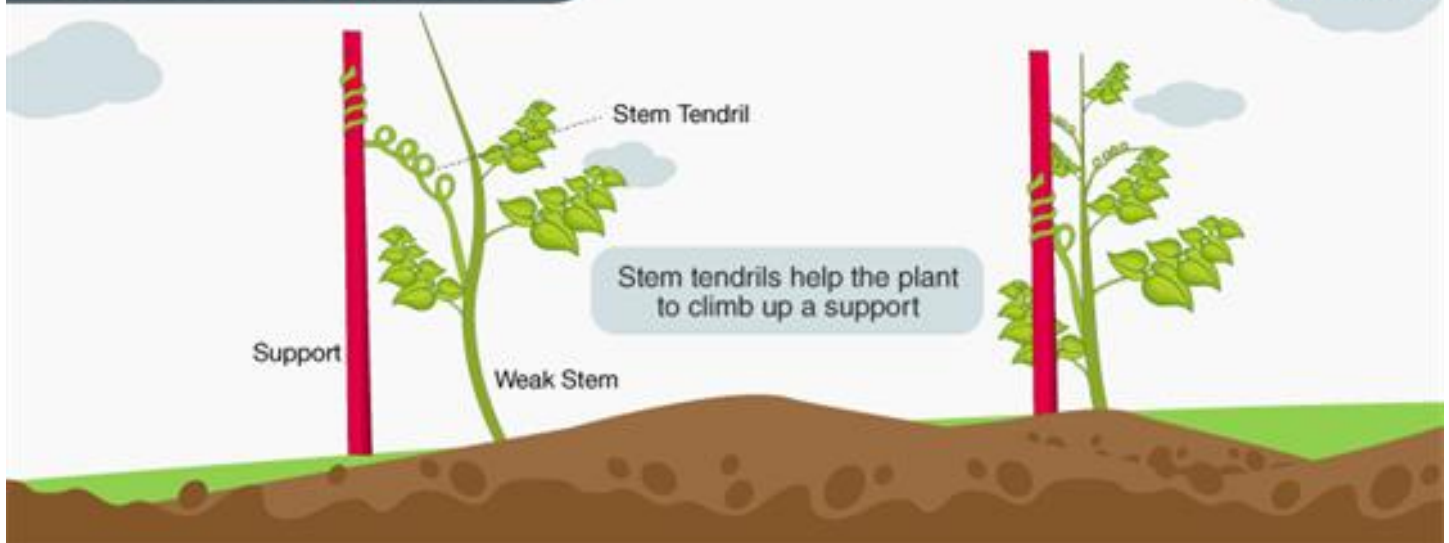
- Towards chemical-positive chemotropism.
- Away from chemical-negative chemotropism.
- The growth of the pollen tube towards the ovule is positive chemotropism.

## Thigmotropism

Movement of plant parts in response to touch is called as thigmotropism.

- Towards touch – Positive thigmotropism.
- Away from touch – negative thigmotropism.
- Movement of tendrils around the support is positive thigmotropism.

# THIGMOTROPISM



# The Endocrine System

## Exocrine Glands

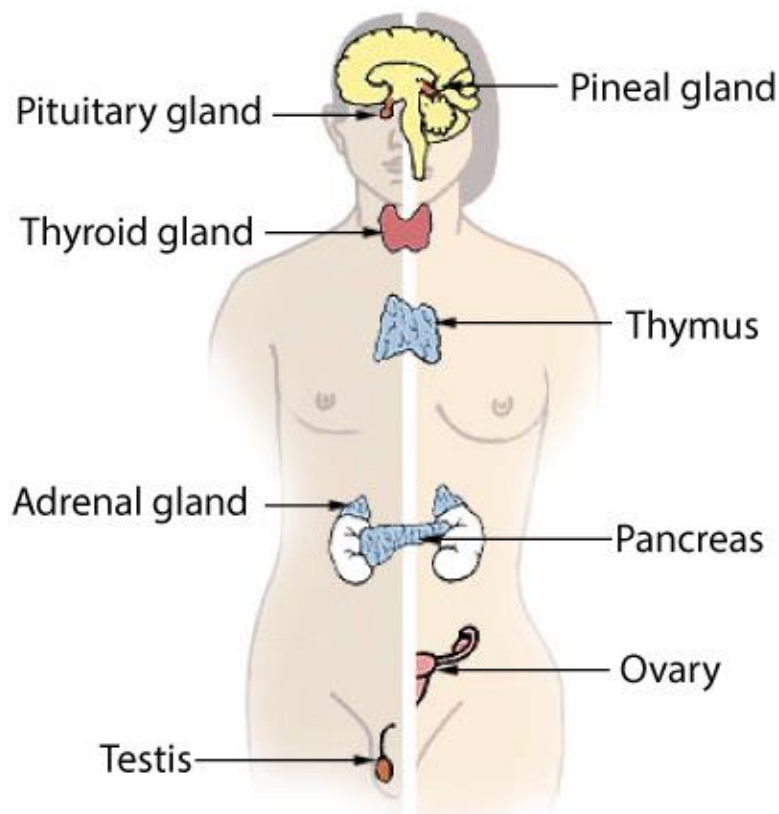
Exocrine glands are glands that discharge secretions by means of ducts, which open onto an epithelial surface.

## Endocrine Glands

Endocrine glands are the ductless glands which secrete hormones into the bloodstream in humans.

The endocrine glands present in the human body are the pituitary, thyroid, adrenal, pineal, pancreas, ovary (female), testis (male), etc. Let us now learn more about each of the glands below.

## THE ENDOCRINE SYSTEM



For more information on Endocrine Glands, watch the below video

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## Pituitary Gland

- It is a pea-sized gland located at the base of the brain.
- It is the master gland, as it controls the secretions of all the other endocrine glands.
- It also secretes Growth Hormone (GH). Under-secretion of GH causes Dwarfism, and over-secretion causes Gigantism in children and 'Acromegaly' in adults.

## Thyroid Gland

- It is a butterfly-shaped gland located in the throat.
- It secretes the hormone 'Thyroxine', which regulates the metabolism of the body.
- Iodine is required to synthesize thyroxine in the body.
- In the case of iodine deficiency, under-secretion of thyroxine leads to goitre.

## Pancreas

- It is a leaf-like gland present behind the stomach in the abdomen.
- It is an endocrine as well as an exocrine gland.
- As an endocrine gland, it manufactures two hormones – Insulin and glucagon. Both these hormones act antagonistically and regulate the sugar level in the blood.
- As an exocrine gland, it secretes enzymes to break down the proteins, lipids, carbohydrates and nucleic acids in food.
- An insufficient amount of insulin from the pancreas leads to diabetes.

## Adrenal Gland

- Occurs in pairs above each kidney.
- It decreases in size with age.
- Secretes the hormone adrenaline, which helps in flight and fight response.
- Also secretes noradrenaline.

## Gonads

- Gonads are the gamete-producing organs – testes in males and ovaries in females.
- The testes produce the male hormone testosterone, and the ovaries produce the female hormones oestrogen and progesterone.
- Testosterone and oestrogen help in producing gametes and are responsible for the sexual characteristics of males and females, respectively.
- Progesterone is the pregnancy hormone.

## Other Endocrine Organs

- The other endocrine organs include the hypothalamus, parathyroid, pineal and thymus glands.

# **Access Answers to NCERT Class 10 Science Chapter 7 Control and Coordination**

## **Questions Page number 119**

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

#### **Solution:**

Reflex actions are the involuntary actions that occur in response to stimuli. They occur without involvement of conscious areas of brain. All the reflex actions are unconscious actions. Reflex action involves the brain and spinal cord of central nervous systems.

On the other hand, voluntary actions are those which occur under the control of cerebellum of the brain. Walking is learnt as we grow. Walking is controlled by the brain and is consciously used whenever required.

### **2. What happens at the synapse between two neurons?**

#### **Solution:**

At the synapse between two neurons, electric signals are converted into chemicals that can easily cross over the gap and pass on the chemical messenger to the next neuron where it is converted back to electrical signal.

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

#### **Solution:**

Cerebellum, which is a part of the brain, is responsible for controlling the motor functioning. Hence, it is the part engaged in the maintenance of posture and equilibrium of the body.

### **4. How do we detect the smell of an agarbatti (incense stick)?**

#### **Solution:**

The smell of an agarbatti is detected by the nose. The olfactory receptors present in the nose sends electrical signal to the fore brain. The fore brain interprets this signal as the smell of the incense stick.

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

#### **Solution:**

Reflex actions are formed instantaneously in response to a stimulus that has no time to think. For instance, the sensory nerves that detect heat are connected to the nerves that

move the muscles of the hand. Such a connection of detecting the signal from the nerves (input) and responding to it quickly (output) is known as reflex arc.

Reflex action are generated in spinal cord and the information also reaches brain. This helps the brain to record this event and remember it for future use. Brain helps the person to get awareness of the stimulus and prevent the danger posed by the situation in the future.

## Questions Page number 119

### 1. What are plant hormones?

#### Solution:

Plant hormones are the organic substances produced at certain sites of a plant and are translocated to other parts based on the requirement. Plant hormones help to coordinate growth, development and responses to the environment. Ex: Auxin's Gibberlin's, cytokines, abscisic acid and ethylene.

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

#### Solution:

Sl. no	Movement of leaves of a sensitive plant	Movement of a shoot towards light
1	It does not depend on the direction of stimulus applied.	Depends on the direction of stimulus applied.
2	Nastic movement	Tropic movement
3	Touch is the stimulus	Light is the stimulus
4	Caused by the sudden loss of water from the swellings at the base of leaves	Caused by the unequal growth on the two sides of the shoot.
5	Not a growth movement	Growth movement
6	Occurs very fast	Occurs slowly

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

#### **Solution:**

Auxins and Gibberlins are the hormone responsible for the growth of plant.

Auxins are responsible for the cell elongation in shoot and also regulate growth.

Gibberlin is responsible for stem elongation and germination.

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

#### **Solution:**

Auxins are the plant hormones produced at the tips of shoots and roots. Auxins are present at the tip of tendrils. When tendrils are attached around any support, their growth is slowed down as auxins are sensitive to touch. This makes them move to the other side of the tip to get support; this makes the other side grow faster than the side of tendril in contact with the support and the tendril bends towards the support.

### **5. Design an experiment to demonstrate hydrotropism.**

#### **Solution:**

To demonstrate hydrotropism in plants.

Procedure :

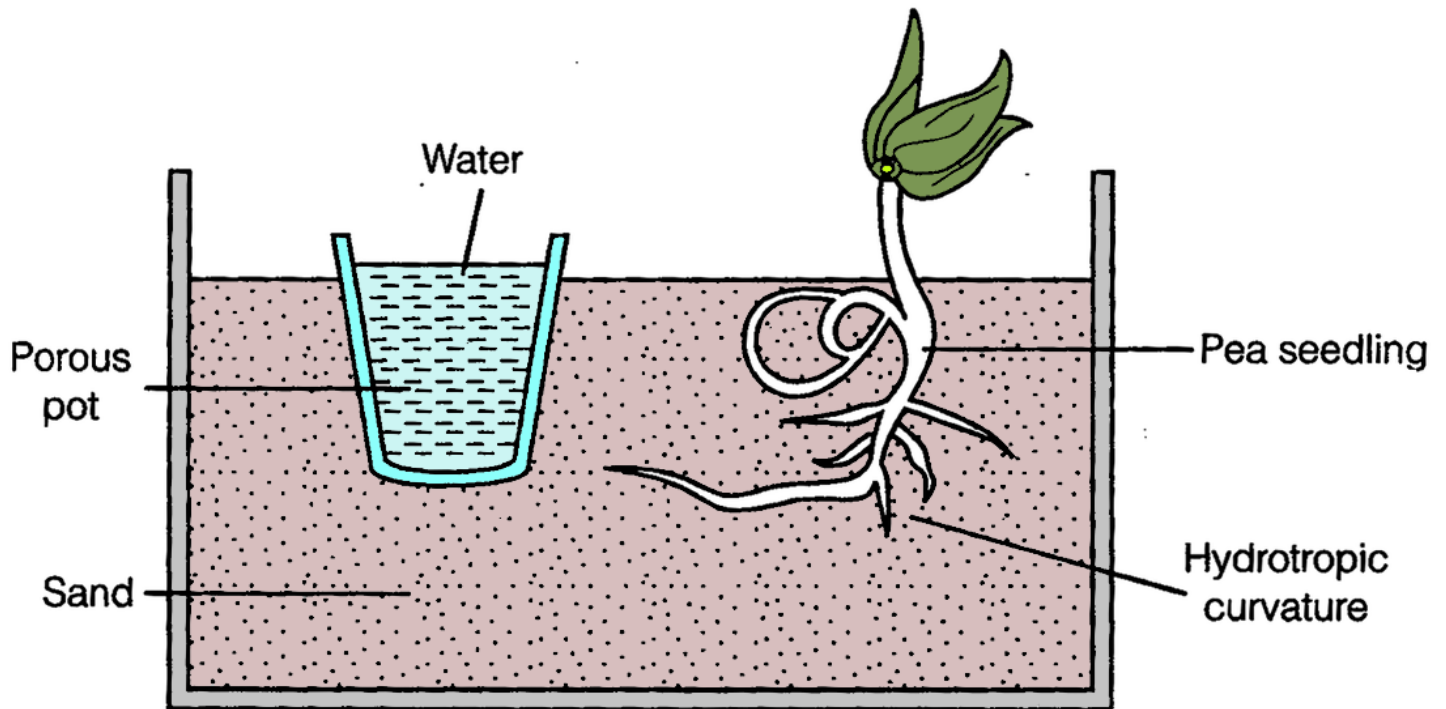
- i. Plant a seedling in a vessel containing soil.
- ii. Adjacent to the seedling put a porous pot containing water.
- iii. Leave the set up for few days.

Observation :

- iv. On examining the roots, it is observed that the roots bend towards the source of water and do not grow straight.

Result :

It confirms that plants show hydrotropism as the roots bend towards the porous pot of water. As hydrotropism is a plant-growth response in which the direction of growth is determined by a stimulus of gradient in water concentration.



### Questions Page number 125

#### 1. How does chemical coordination take place in animals?

##### **Solution:**

Chemical coordination takes place in animals with the help of chemical messengers called hormones. Hormones are the chemicals that are secreted by specific endocrine glands. Hormones regulate the growth, development and homeostasis of the animals.

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

##### **Solution:**

Usage of iodized salt is advisable to avoid the deficiency of iodine. If the intake of iodine is low, the release of thyroxine from the thyroid gland will be decreased. This affects fat, carbohydrate and protein metabolism. Thus, a person may have goitre if the intake of iodine is lowered.

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

##### **Solution:**

Adrenaline is a hormone secreted when a person is frightened or mentally disturbed. When Adrenaline reaches the heart, heartbeat will increase to increase blood supply to our muscles. Adrenaline also increases the breathing rate because of contraction of diaphragm and the rib muscles. Adrenaline rush also increases blood pressure and allows entry of more glucose into blood. All these occur when our body responds to the secretion of adrenaline into our blood.

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

##### **Solution:**

Diabetes is a condition where the pancreatic cells of a person stops producing or reduces the production of insulin hormone. Insulin regulates blood glucose by converting extra glucose to glycogen. When insulin is not produced adequately, a person's blood glucose level is affected and this leads to adverse effects. In order to maintain the insulin and blood glucose levels, diabetes patients are treated with injections of insulin.

#### **Exercise Questions Page number 126**

##### **1. Which of the following is a plant hormone?**

**(a) Insulin**

**(b) Thyroxin**

**(c) Oestrogen**

**(d) Cytokinin**

##### **Solution:**

Answer is d) cytokinin.

Cytokinin is a plant hormone whereas Insulin, Thyroxin, Oestrogen are the hormones produced by animals.

##### **2. The gap between two neurons is called a**

**(a) Dendrite.**

**(b) Synapse.**

**(c) Axon.**

**(d) Impulse.**

##### **Solution:**

Answer is (b) Synapse

Dendrite is a short branched extension of a nerve cell, along which impulses received from other cells at synapses are transmitted to the cell body.

An axon or nerve fiber is a long, slender projection of a nerve cell or neuron in vertebrates that typically conducts electrical impulses known as action potentials away from the



nerve cell body. The function of the axon is to transmit information to different neurons, muscles, and glands.

Impulse is an electrical signal that travels along axon.

### **3. The brain is responsible for**

**(a) Thinking.**

**(b) Regulating the heartbeat.**

**(c) Balancing the body.**

**(d) all of the above.**

#### **Solution:**

Answer is (d) all the above

Brain is responsible for thinking, brain regulates the heartbeat, and it balance the body.

### **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?**

#### **Solution:**

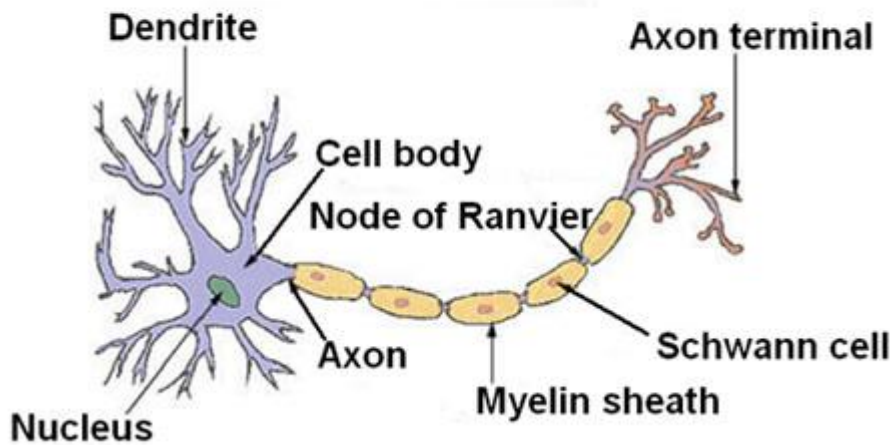
Receptors are present throughout our body – mainly in sense organs. Receptors collect the information about changes that happen around us and send the signal/information to the brain which responds to the change detected. When receptors do not work properly, the environmental stimuli are not able to create nerve impulses and body does not respond.

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

#### **Solution:**

Neurons are nerve cells which are functional units of the nervous system. Three main parts of neurons are Dendrites, Axons and cell body.

# Structure of a Typical Neuron



Dendrite: Detects information and sends it to cell body

Cell Body: Maintains growth of the cell

Axon: Conducts messages away from cell body and signal to next neuron.

## 6. How does phototropism occur in plants?

### Solution:

Directional movement and growth of plant in response to light is called as phototropism. Phototropism occurs due to increased auxin on the dark side and decreased auxin on the illuminated side. Because of presence of more auxin, a leaf in the darker side grows faster causing it to bend towards the source of light.

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

### Solution:

In case of a spinal cord injury, signals coming from the nerves, as well as the signals coming to the receptors, will be disrupted. Both these signals meet in a bundle in the spinal cord. Hence, both these signals get disrupted.

## 8. How does chemical coordination occur in plants?

### Solution:

Plant growth, development and responses to the environment is controlled and coordinated by a special class of chemical substances known as hormones. Hormones are produced in one part of the plant and are transported to all the needy parts of the plant. The five major types of phytohormones are auxins, gibberellins, cytokinins, abscisic

acid, and ethylene. These phytohormones are either growth promoters (such as auxins, gibberellins, cytokinins, and ethylene) or growth inhibitors such as abscisic acid.

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

### Solution:

There are various organs in an organism. These organs must be carefully controlled and coordinated for the survival of an organism. In the body of an organism, various fluids are secreted from the glands of the endocrine system. These hormones are responsible for the overall growth and development of an organism. All other daily decisions that include voluntary and involuntary actions are controlled by the central nervous system (CNS).

Coordination is needed for all human activities we perform. Our nervous system receives information from surroundings which is processed and a response is elicited. The endocrine system (hormonal system) helps in integrating various metabolic activities like reproduction, development, and all reflex actions (cope up with various give up situations).

The hormonal system in plants helps in process of photosynthesis; they need carbon dioxide, water and sunlight. The stomatal opening in leaves opens up to allow in carbon dioxide gas, the roots bend towards water, the stem grows towards sunlight, and the tendrils in climbing plants are supported by the hormonal system of the plant body.

Thus, we need a control and coordination system in an organism.

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

### Solution:

Reflex actions	Involuntary actions
1. Rapid automatic responses to a stimulus without the conscious involvement of the brain	1. Occurs without the consciousness of an organism
2. Controlled by spinal cord	2. Controlled by mid brain or medulla oblongata
3. Very quick and instantaneous	3. Relatively slower
4. May involve any muscle or a gland	4. Involves only smooth muscles

5. Can be conditioned	5. Cannot be influenced by external conditioning
Examples: Blinking of eyes, salivation	Examples: Beating of heart, blood circulation

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

**Solution:**

	Nervous control		Hormonal Control
1	It consists of nerve impulses between PNS, CNS and Brain.	1	It consists of the endocrine system which secretes hormones directly into blood.
2	Here response time is very short.	2	Here response time is very long.
3	Nerve impulses are not specific in their action.	3	Each hormone has specific actions.
4	The flow of information is rapid.	4	The flow of information is very slow.

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

**Solution:**

Sl. no	Movement in sensitive plants		Movement in our legs
1	The movement in a sensitive plant is a response to stimulus (touch) which is an involuntary action.	1	Movement in our legs is a voluntary action.
2	No special tissue is there for the transfer of information	2	A complete system CNS and PNS is there for the information exchange.

3	Plant cells do not have specialized protein for movements.	3	Animal cells have specialized protein which help muscles to contract.
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## Access Answers to NCERT Exemplar Class 10 Science Chapter 7 – Control and Coordination

### Multiple-choice Questions

**1. Which of the following statements is correct about receptors?**

- (a) Gustatory receptors detect taste, while olfactory receptors detect smell**
- (b) Both gustatory and olfactory receptors detect smell**
- (c) Auditory receptors detect smell, and olfactory receptors detect taste**
- (d) Olfactory receptors detect taste, and gustatory receptors smell**

**Soln:**

The answer is (a) Gustatory receptors detect taste, while olfactory receptors detect smell

**Explanation:**

A receptor is a cell which is sensitive for the external stimulus such as light, taste, and smell. For example, Photoreceptors detect light, Gustatory receptors detect taste, and Olfactory receptors detect smell.

**2. Electrical impulse travels in a neuron from**

- (a) Dendrite → axon → axonal end → cell body**
- (b) Cell body → dendrite → axon → axonal end**
- (c) Dendrite → cell body → axon → axonal end**
- (d) Axonal end → axon → cell body → dendrite**

**Soln:**

The answer is (c) Dendrite → cell body → axon → axonal end

**Explanation:**

Stimulus is received by dendrites which are transmitted to cyton through the axon. Stimulus reaches the terminal branches called the axonal end, from where they are transmitted to another neuron.

**3. In a synapse, a chemical signal is transmitted from**

- (a) dendritic end of one neuron to the axonal end of another neuron**
- (b) axon to the cell body of the same neuron**
- (c) cell body to the axonal end of the same neuron**
- (d) axonal end of one neuron to the dendritic end of another neuron**

**Soln:**

The answer is (d) the axonal end of one neuron to the dendritic end of another neuron.

**Explanation:**

The electric impulse travels from the axon to the dendrite of another neuron through a synaptic gap which consists of SYNAPSE.

**4. In a neuron, the conversion of electrical signal to a chemical signal occurs at/in**

- (a) cell body**
- (b) axonal end**
- (c) dendritic end**
- (d) axon**

**Soln:**

The answer is (b) axonal end

**Explanation:**

At the axonal end, the electric impulse triggers the release of neurotransmitters. These chemicals enter the dendrite of another neuron to transmit the signal.

**5. Which is the correct sequence of the components of a reflex arc?**

- (a) Receptors → Muscles → Sensory neuron → Motor neuron → Spinal cord**
- (b) Receptors → Motor neuron → Spinal cord → Sensory neuron → Muscle**
- (c) Receptors → Spinal cord → Sensory neuron → Motor neuron → Muscle**

**(d) Receptors → Sensory neuron → Spinal cord → Motor neuron → Muscle**

**Soln:**

The answer is (d) Receptors → Sensory neuron → Spinal cord → Motor neuron → Muscle

**Explanation:**

Sensory neurons receive signals from receptors. These signals are sent to the spinal cord, which reaches Muscles through the motor neuron.

**6. Which of the following statements is true?**

**(i) Sudden action in response to something in the environment is called reflex action**

**(ii) Sensory neurons carry signals from the spinal cord to muscles**

**(iii) Motor neurons carry signals from receptors to the spinal cord**

**(iv) The path through which signals are transmitted from a receptor to a muscle or a gland is called the reflex arc**

**(a) (i) and (ii)**

**(b) (i) and (iii)**

**(c) (i) and (iv)**

**(d) (i), (ii) and (iii)**

**Soln:**

The answer is (c) (i) and (iv)

**Explanation:**

Sensory neurons carry signals from muscles to the spinal cord hence statements ii) and iv) are wrong statements.

**7. Which of the following statements is true about the brain?**

**(i) The main thinking part of the brain is the hindbrain**

**(ii) Centres of hearing, smell, memory, sight etc., are located in the forebrain.**

**(iii) Involuntary actions like salivation, vomiting, and blood pressure are controlled by the medulla in the hindbrain**

**(iv) Cerebellum does not control the posture and balance of the body**

**(a) (i) and (ii)**

**(b) (i), (ii) and (iii)**

**(c) (ii) and (iii)**

**(d) (iii) and (iv)**

**Soln:**

The answer is (c) (ii) and (iii)

**Explanation:**

Forebrain is the thinking part of the brain hence statement i) is wrong. Cerebellum controls posture and balance of the body hence statement iv) is wrong

**8. Posture and balance of the body is controlled by**

**(a) cerebrum**

**(b) cerebellum**

**(c) medulla**

**(d) pons**

**Soln:**

The answer is (b) cerebellum

**Explanation:**

Cerebrum is responsible for sensory processing. Medulla controls involuntary functions. Pons regulates respiration and controls involuntary action sensations such as touch and pain.

**9. Spinal cord originates from**

**(a) cerebrum**

**(b) medulla**

**(c) pons**

**(d) cerebellum**

**Soln:**

The answer is (b) medulla



**10. The movement of the shoot towards light is**

- (a) geotropism**
- (b) hydrotropism**
- (c) chemotropism**
- (d) phototropism**

**Soln:**

The answer is (d) phototropism

**Explanation:**

The growth of plant roots towards or away from moisture is called hydrotropism. Plant growth in response to gravitational force is called geotropism. The growth of plants in response to the chemical stimulus is called chemotropism.

**11. The main function of abscisic acid in plants is to**

- (a) increase the length of cells**
- (b) promote cell division**
- (c) inhibit growth**
- (d) promote the growth of stem**

**Soln:**

The answer is (c) inhibit growth

**Explanation:**

Auxins increase the length of cells. Cytokinins promote cell division. Gibberellins promote the growth of the stem.

**12. Which of the following is not associated with the growth of a plant?**

- (a) Auxin**
- (b) Gibberellins**
- (c) Cytokinins**
- (d) Abscisic acid**

**Soln:**

The answer is (d) Absciscic acid

**Explanation:**

Absciscic acid inhibits the growth of plants; hence, it is not associated with the growth of the plant.

**13. Iodine is necessary for the synthesis of which hormone?**

**(a) Adrenaline**

**(b) Thyroxin**

**(c) Auxin**

**(d) Insulin**

**Soln:**

The answer is (b) Thyroxin

**14. Choose the incorrect statement about insulin**

**(a) It is produced from pancreas**

**(b) It regulates the growth and development of the body**

**(c) It regulates blood sugar level**

**(d) Insufficient secretion of insulin will cause diabetes**

**Soln:**

The answer is (b) It regulates the growth and development of the body

**15. Select the mismatched pair**

**(a) Adrenaline: Pituitary gland**

**(b) Testosterone: Testes**

**(c) Estrogen: Ovary**

**(d) Thyroxin: Thyroid gland**

**Soln:**

The answer is (a) Adrenaline: Pituitary gland

**Explanation:**

Adrenaline is secreted by the Adrenal gland, and the Pituitary gland produces TSH, FSH and GSH hormones.

**16. The shape of guard cells changes due to changes in the**

- (a) protein composition of cells**
- (b) temperature of cells**
- (c) amount of water in cells**
- (d) position of the nucleus in the cells**

**Soln:**

The answer is (c) amount of water in cells

**Explanation:**

Excess of water will turn guard cells turgid, and loss of water will turn guard cells flaccid.

**17. The growth of tendril in pea plants is due to**

- (a) effect of light**
- (b) effect of gravity**
- (c) rapid cell divisions in tendrillar cells that are away from the support**
- (d) rapid cell divisions in tendrillar cells in contact with the support**

**Soln:**

The answer is (c) rapid cell divisions in tendrillar cells that are away from the support.

**18. The growth of pollen tubes towards ovules is due to**

- (a) hydrotropism**
- (b) chemotropism**
- (c) geotropism**
- (d) phototropism**

**Soln:**

The answer is (b) chemotropism

**Explanation:**

Chemicals released by ovules stimulate the growth of pollen tubes towards ovules.

**19. The movement of the sunflower in accordance with the path of the sun is due to**

- (a) phototropism**
- (b) geotropism**
- (c) chemotropism**
- (d) hydrotropism**

**Soln:**

The answer is (a) phototropism

**Explanation:**

The movement of shoot towards light is called phototropism.

Plant growth in response to gravitational force is called geotropism.

The growth of plant in response to chemical stimulus is called chemotropism.

The growth of plant roots towards or away from moisture is called hydrotropism.

**20. The substance that triggers the fall of mature leaves and fruits from plants is due to**

- (a) auxin**
- (b) gibberellin**
- (c) abscisic acid**
- (d) cytokinin**

**Soln:**

The answer is (c) abscisic acid

**Explanation:**

Abscisic acid forms a layer of abscission. This layer disconnects the living tissue of the leaf from the other parts.

**21. Which of the following statements about the transmission of nerve impulse is incorrect?**

- (a) Nerve impulse travels from the dendritic end towards the axonal end**

**(b) At the dendritic end, electrical impulses bring about the release of some chemicals, which generate an electrical impulse at the axonal end of another neuron**

**(c) The chemicals released from the axonal end of one neuron cross the synapse and generate a similar electrical impulse in a dendrite of another neuron**

**(d) A neuron transmits electrical impulses not only to another neuron but also to muscle and gland cells**

**Soln:**

The answer is (b) At the dendritic end, electrical impulses bring about the release of some chemicals, which generate an electrical impulse at the axonal end of another neuron.

**Explanation:**

Chemicals or neurotransmitters are released at the axonal end, not on the dendritic end. Hence, statement b) is incorrect.

**22. Involuntary actions in the body are controlled by**

**(a) medulla in forebrain**

**(b) medulla in midbrain**

**(c) medulla in hindbrain**

**(d) medulla in the spinal cord**

**Soln:**

The answer is (c) medulla in hindbrain.

**Explanation:**

Medulla is present only in the hindbrain.

**23. Which of the following is not an involuntary action?**

**(a) Vomiting**

**(b) Salivation**

**(c) Heartbeat**

**(d) Chewing**

**Explanation:**

The answer is (d) Chewing

**24. When a person is suffering from severe cold, he or she cannot**

**(a) differentiate the taste of an apple from that of an ice cream**

**(b) differentiate the smell of a perfume from that of an agarbatti**

**(c) differentiate red light from green light**

**(d) differentiate a hot object from a cold object**

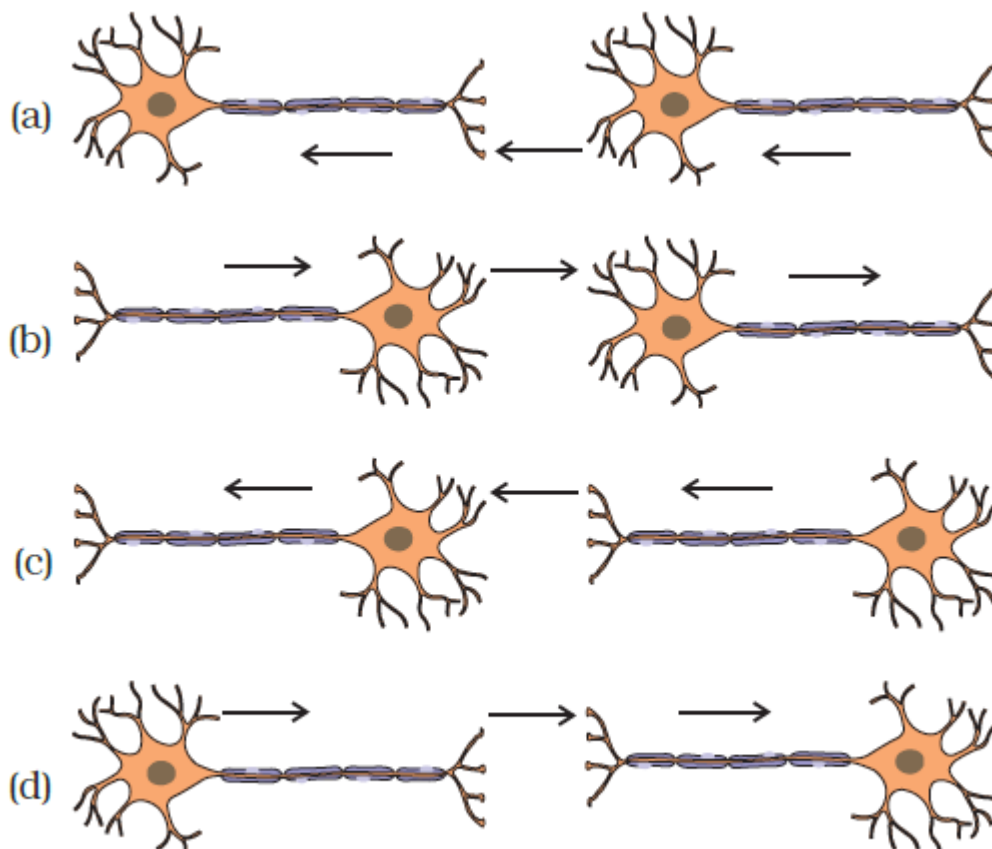
**Soln:**

The answer is (b) differentiate the smell of a perfume from that of an agarbatti.

**Explanation:**

During cold olfactory receptors get blocked hence we cannot differentiate smell.

**25. What is the correct direction of the flow of electrical impulses?**



**Fig. 7.1**

**Soln:**

The answer is c)

**Explanation:**

The dendrites of a neuron receive electrical impulse from the axonal end of another neuron. After that, the electrical impulse travels through the cell body, axon, to the axonal end.

**26. Which statement is not true about thyroxin?**

- (a) Iron is essential for the synthesis of thyroxin**
- (b) It regulates carbohydrates, protein and fat metabolism in the body**
- (c) The thyroid gland requires iodine to synthesise thyroxin**
- (d) Thyroxin is also called the thyroid hormone**

**Soln:**

The answer is (a) Iron is essential for the synthesis of thyroxin

**Explanation:**

Iodine is essential for the synthesis of thyroxin but not iron hence statement a) is wrong

**27. Dwarfism results due to**

- (a) Excess secretion of thyroxin**
- (b) Less secretion of growth hormone**
- (c) Less secretion of adrenaline**
- (d) Excess secretion of growth hormone**

**Soln:**

The answer is (b) Less secretion of growth hormone

**Explanation:**

Growth hormones are responsible for the overall growth of an organism. When there is no secretion of growth hormones, it leads to dwarfism.

**28. Dramatic changes of body features associated with puberty are mainly because of the secretion of**

- (a) oestrogen from testes and testosterone from ovary**
- (b) estrogen from adrenal gland and testosterone from pituitary gland**
- (c) testosterone from testes and estrogen from ovary**

**(d) testosterone from thyroid gland and estrogen from pituitary gland**

**Soln:**

The answer is (c) testosterone from testes and estrogen from ovary.

**Explanation:**

These are the sex hormones responsible for the secondary character that appear after puberty. Males secrete testosterone, and females secrete estrogen.

**29. A doctor advised a person to take an injection of insulin because**

**(a) his blood pressure was low**

**(b) his heart was beating slowly**

**(c) he was suffering from goitre**

**(d) his sugar level in blood was high**

**Soln:**

The answer is (d) his sugar level in blood was high.

**Explanation:**

Patients suffering from diabetes will have high blood glucose due to non-functioning or lack of insulin hormone. Such patients are administered with insulin injections to regulate blood glucose.

**30. The hormone which increases fertility in males is called**

**(a) oestrogen**

**(b) testosterone**

**(c) insulin**

**(d) growth hormone**

**Soln:**

The answer is (b) testosterone

**31. Which of the following endocrine glands is unpaired?**

**(a) Adrenal**

**(b) Testes**



**(c) Pituitary**

**(d) Ovary**

**Soln:**

The answer is (c) Pituitary

**Explanation:**

Adrenal glands are two, which are present on top of each kidney. Testes is a paired gland in males which produces male sex hormones. Ovary is a paired gland in females which produces female sex hormones. The pituitary gland is an independent gland present below the brain. It is called as master gland, as it secretes major of the hormones.

**32. The junction between two neurons is called**

**(a) cell junction**

**(b) neuromuscular junction**

**(c) neural joint**

**(d) synapse**

**Soln:**

The answer is (d) synapse

**Explanation:**

A synapse is a structure that allows a neuron to pass an electric signal to the next neuron or effector cell. Hence it is a junction between two neurons.

**33. In humans, life processes are controlled and regulated by**

**(a) reproductive and endocrine systems**

**(b) respiratory and nervous systems**

**(c) endocrine and digestive systems**

**(d) nervous and endocrine systems**

**Soln:**

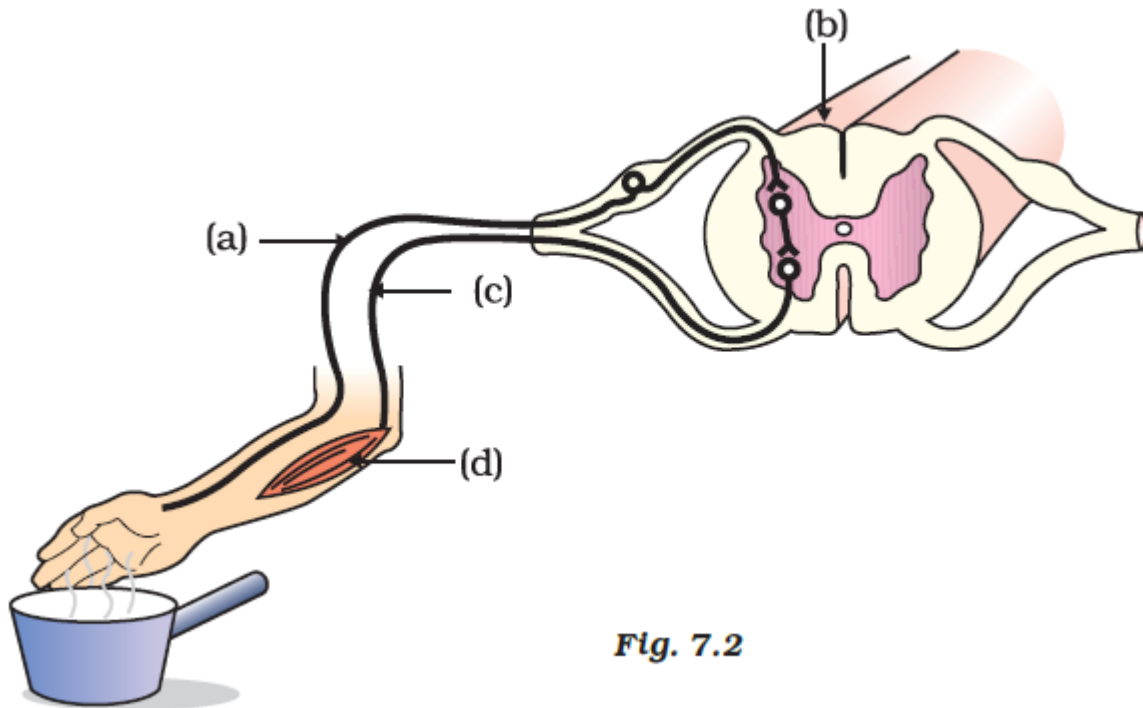
The answer is (d) nervous and endocrine systems.

**Explanation :**

Reproductive, respiratory and digestive systems have no role to play in the control and regulation of life processes. It is the nervous system and the endocrine system that control and regulates all the processes, including the reproductive, respiratory and digestive systems.

## Short Answer Questions

**34. Label the parts (a), (b), (c) and (d) and show the direction of the flow of electrical signals in Figure 7.2.**



**Fig. 7.2**

**Soln:**

1. **Sensory neuron**
2. **Spinal cord**
3. **Motor neuron**
4. **Muscle**

**35. Name the plant hormones responsible for the following**

**(a) elongation of cells**

**(b) growth of stem**

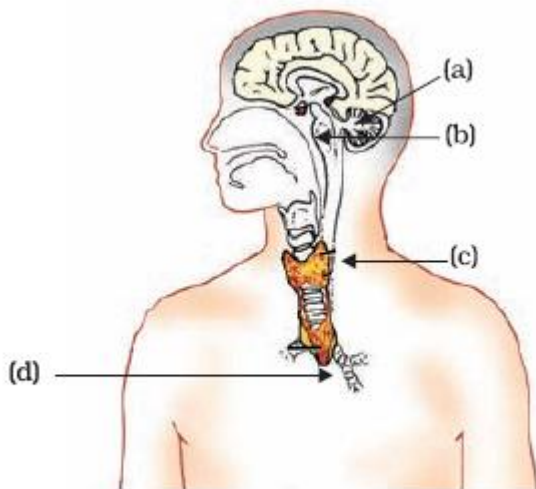
**(c) promotion of cell division**

**(d) falling of senescent leaves.**

**Soln:**

1. Auxin
2. Gibberellin
3. Cytokinin
4. Absciscic acid

**36. Label the endocrine glands in Figure 7.3.**

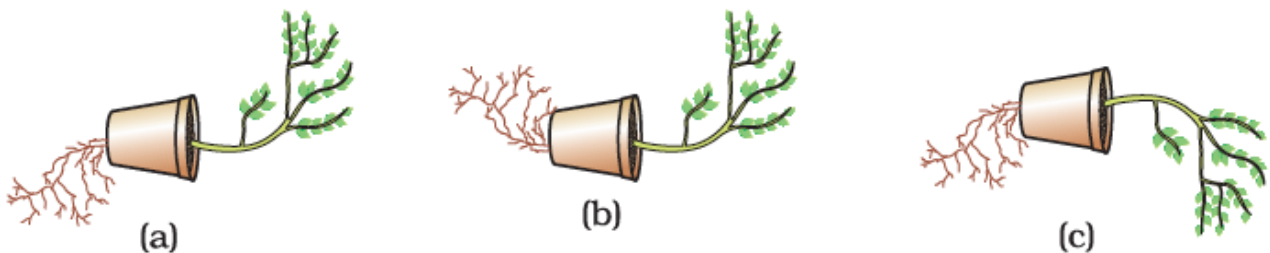


**Fig. 7.3**

**Soln:**

1. Pineal Gland
2. Pituitary gland
3. Thyroid gland
4. Thymus

**37. In Figure 7.4 (a), (b) and (c), which appears more accurate and why?**

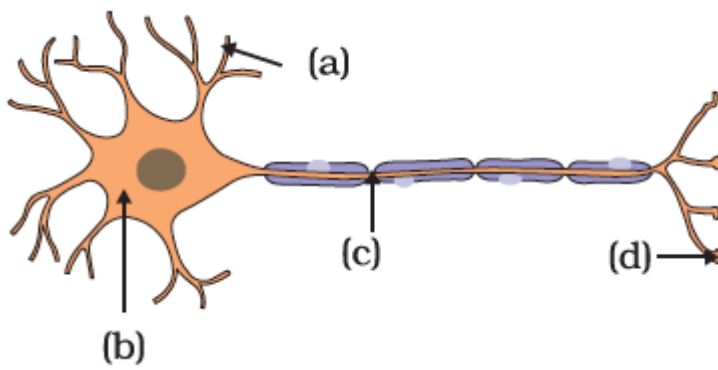


**Fig. 7.4**

**Soln:**

Figure a) is more accurate because, in the figure, a plant root shows positive geotropism, and a shoot shows positive phototropism.

**38. Label the parts of a neuron in Figure 7.5.**



**Soln:**

1. Dendrite
2. Cell body
3. Axon
4. Axon terminal

**39. Match the terms of Column (A) with those of Column (B)**

Column A	Column B
(a) Olfactory receptors	(i) Tongue
(b) Thermo receptors (temperature receptors)	(ii) Eye
(c) Gustatoreceptors	(iii) Nose
(d) Photoreceptors	(iv) Skin

**Soln:**

Column A	Column B
(a) Olfactory receptors	(iii) Nose
(b) Thermo receptors (temperature receptors)	(iv) Skin
(c) Gustatoreceptors	(i) Tongue

**40. What is a tropic movement? Explain with an example.****Soln:**

The directional growth movement of a plant due to an external stimulus is called a tropic movement. Movement can be either toward the stimulus or away from the stimulus. For example, roots show positive geotropic movement, and they grow with the direction of gravity, whereas shoots show negative geotropic movement.

**41. What will happen if the intake of iodine in our diet is low?**

Iodine is essential for the synthesis of the hormone thyroxine. If we take a low iodine diet, it leads to hypothyroidism which results in a disease called goitre.

**42. What happens at the synapse between two neurons?****Soln:**

At Synapse nerve impulse of a nerve cell gets converted to neurotransmitters which travel towards the dendrites of the next neuron, leading to an electric impulse.

**43. Answer the following :**

**(a) Which hormone is responsible for the changes noticed in females at puberty?**

**(b) Dwarfism results due to deficiency of which hormone?**

**(c) Blood sugar level rises due to deficiency of which hormone?**

**(d) Iodine is necessary for the synthesis of which hormone?**

**Soln:**

a) **Oestrogen** hormone is responsible for the changes noticed in females at puberty

b) Dwarfism results due to deficiency of **Growth Hormones**.

c) Blood sugar level rises due to deficiency of **Insulin** Hormone

d) Iodine is necessary for the synthesis of **Thyroxine** Hormone

**44. Answer the following :**

**(a) Name the endocrine gland associated with the brain.**

**(b) Which gland secretes digestive enzymes as well as hormones?**

**(c) Name the endocrine gland associated with kidneys.**

**(d) Which endocrine gland is present in males but not in females?**

**Soln:**

**a) Pituitary gland** is associated with the brain.

**b) The pancreas** secretes digestive enzymes as well as hormones.

**c) Adrenal gland** is associated with kidneys.

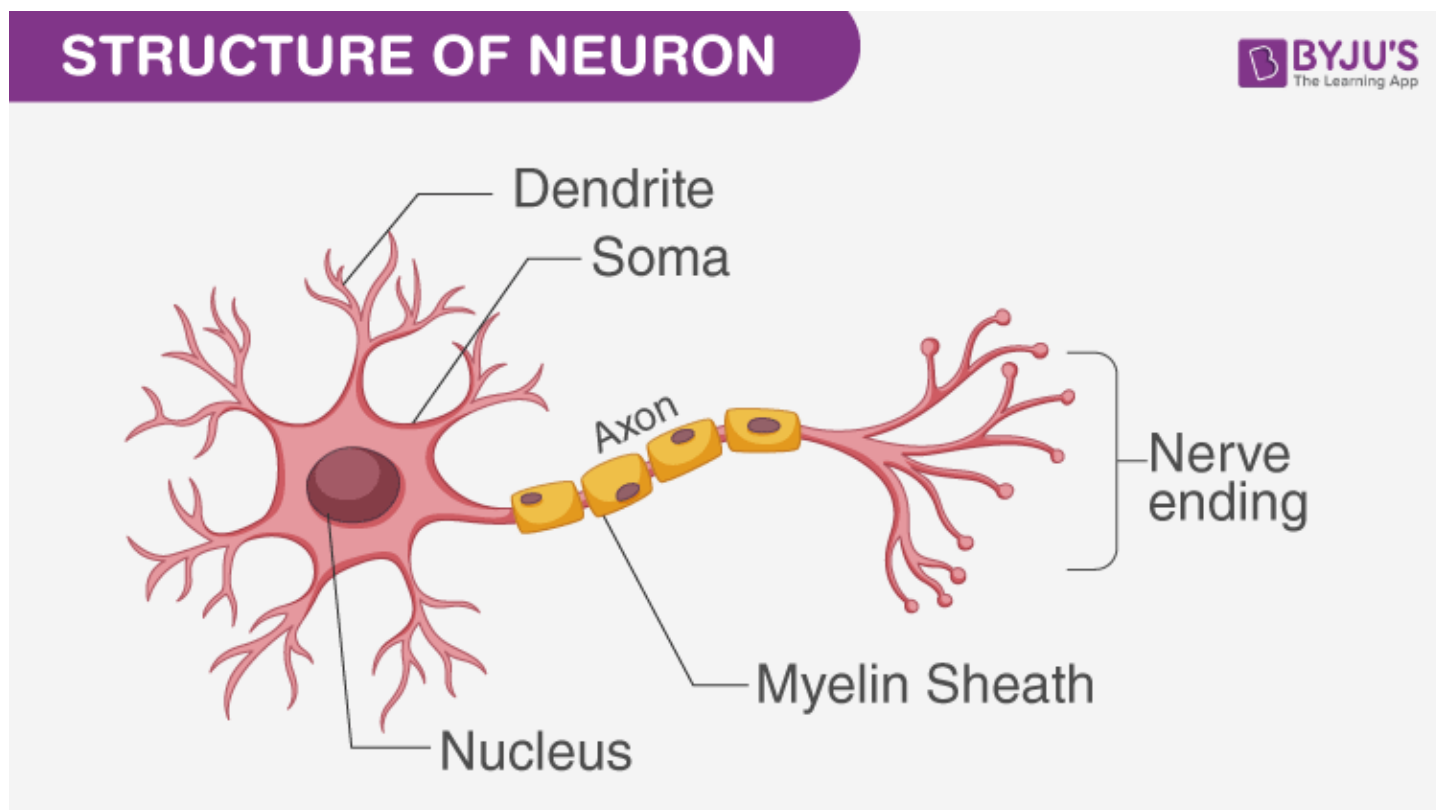
**d) The testis** is present in males but not in females.

## Long Answer Questions

**45. Draw the structure of a neuron and explain its function.**

**Soln:**

The neuron is a highly specialised cell responsible for the transmission of nerve impulses.



Soma or cell body is a star-shaped hair-like structure. Hair-like structures are called dendrites. Dendrites receive nerve impulses.

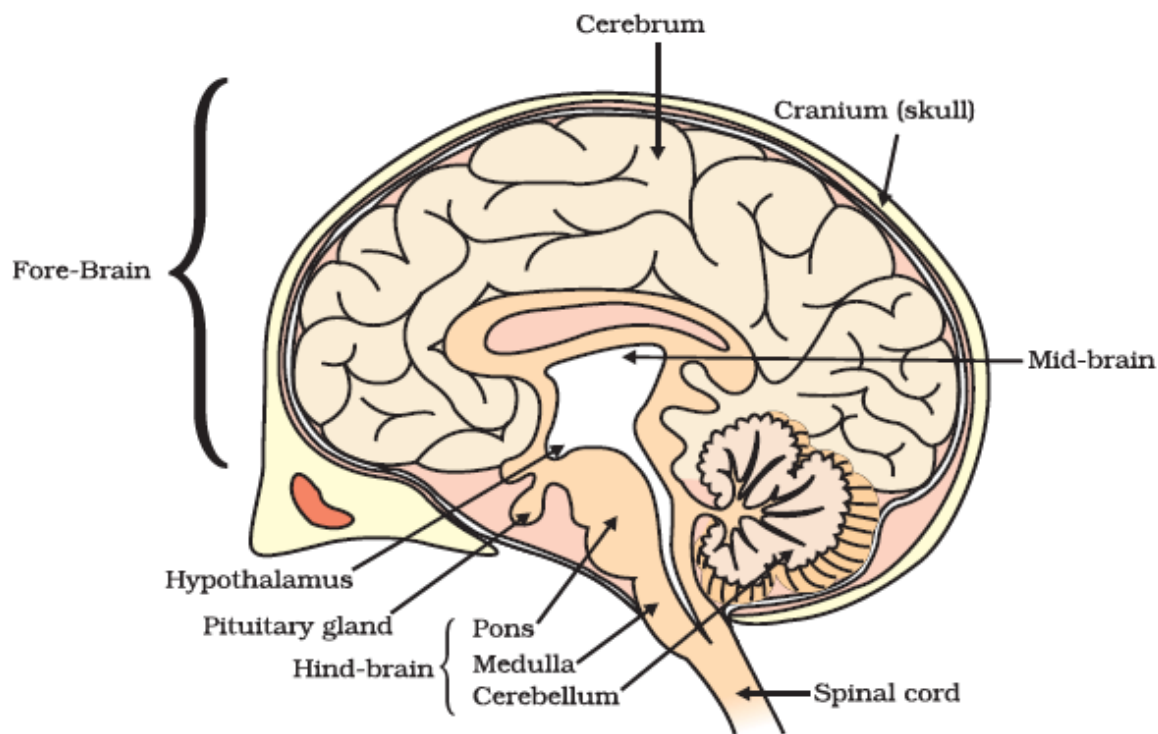
Axon is the tail of the nucleus it ends in hair-like structures which makes nerve endings. Nerve endings relay nerve impulses.

Myelin sheath acts as an insulator around the axon. It insulates axons from the electrical impulses from the surroundings.

The function of a neuron is to process and transmit information from the brain to all parts of the body.

**46. What are the major parts of the brain? Mention the functions of different parts.**

**Soln:**



**Figure 7.3** Human brain

## Functions of brain Parts

### Forebrain:

The forebrain is the main thinking part of the brain. It has regions which receive sensory impulses from various receptors. Separate areas of the fore-brain are specialised for hearing, smell, sight and so on.

### Midbrain and Hindbrain:

Involuntary actions are controlled by the mid-brain and hind-brain.

### Cerebellum:

Responsible for voluntary actions and maintaining the posture and balance of the body.

### Cerebrum:

Cerebrum is responsible for sensory processing.

**Medulla:**

Medulla controls involuntary functions.

**Pons:**

Pons regulates respiration and controls involuntary action sensations such as touch and pain.

**Hypothalamus:**

Hypothalamus control the sleep and wake cycle

**47. What constitutes the central and peripheral nervous systems? How are the components of the central nervous system protected?**

**Soln:**

The central nervous system comprises of brain and spinal cord. The peripheral nervous system is composed of nerves which are outside the spinal cord.

The central nervous system has a well-developed system for its protection. The brain is enclosed in a hard shell known as the skull. The spinal cord is enclosed in the vertebral column for its protection. Along with these, there is a cerebrospinal fluid which protects the brain from mechanical shocks.

**48. Mention one function for each of these hormones :**

**(a) Thyroxin**

**(b) Insulin**

**(c) Adrenaline**

**(d) Growth hormone**

**(e) Testosterone.**

**Soln:**

**Thyroxin:**

Thyroxin regulates carbohydrate, protein and fat metabolism in the body so as to provide the best balance for growth.

**Insulin:**



Insulin regulates blood glucose levels. If insulin is not secreted at an appropriate level, it leads to a rise in blood glucose level which results in many adverse effects on life processes.

### **Adrenaline:**

Adrenaline prepares our body for emergency situations. Adrenaline is also called a fight and flight hormone.

### **Growth Hormone:**

Growth hormone is responsible for the growth and regulation of growth.

### **Testosterone:**

Testosterone is responsible for the expression of secondary sexual characteristics in the body.

## **49. Name various plant hormones. Also, give their physiological effects on plant growth and development.**

### **Soln:**

1. Auxin- responsible for the elongation of cells
2. Gibberellin- responsible for the growth of the stem and thereby increases the girth of the stem
3. Cytokinin promotes cell division in plants
4. Absciscic acid stops the growth of the plant, and it makes leaves and fruits fall from the plant.

## **50. What are reflex actions? Give two examples. Explain a reflex arc.**

The sudden involuntary movement in a voluntary organ; in response to a stimulus; is called reflex action.

### **Examples of reflex action:**

(a) Moving your hand away from a hot iron plate

(b) Blinking of eyes

### **Reflex Arc.**

The reflex arc is a path of electrical impulse during a reflex action. It is composed of sensory neurons, the spinal cord, motor neurons and muscles.

### **Steps of the reflex arc**

- The sensory neuron picks signals from the stimulus and carries the signals to the spinal cord.

- Spinal cord process the signals and sends a message through the motor neuron.
- Motor neuron transmits the signals to the effector muscle so that the muscle can take immediate action.

**51. “Nervous and hormonal systems together perform the function of control and coordination in human beings.” Justify the statement.**

Control and coordination in human beings are under the influence of the nervous system. Brain control all the organelles and organ system. The control is obtained by the network of neurons, which carry signals through neurotransmitters in the form of electric impulses to the brain and from the brain.

The hormonal system consists of varieties of hormones secreted by various glands in our body. The hormonal system coordinates the function of the nervous system. Hormones indirectly control the life processes by a feedback mechanism. They can produce hormones when required and can stop production when not required.

**52. How does chemical coordination take place in animals?**

**Soln:**

Chemical coordination takes place in animals through hormones produced by glands present in animals. Hormones are directly released into the bloodstream to reach the target site. Hormones control the behaviour of the target tissue.

**Example:**

The adrenal gland secretes Adrenalin which reaches the heart, lungs and Gastrointestinal tract. The heart speeds up its pumping action so that more blood can be supplied to the limbs and facial muscles. But the activity of the GI tract is slowed down to ensure better blood supply in limbs. Thus, adrenalin prepares the body for a fight or flight situation.

**53. Why is the flow of signals in a synapse from the axonal end of one neuron to the dendritic end of another neuron but not the reverse?**

**Soln:**

The electrical impulse travels through a neuron. But to be transmitted to another neuron, it needs to be passed in the form of neurotransmitters. Neurotransmitters are specialized chemicals. They can enter a neuron only through specialized channels. Such channels are present in dendrites but not in axons. On the other hand, a neurotransmitter can enter a dendrite. Due to this, the flow of signals in a synapse is from the axonal end of one neuron to the dendritic end of another neuron but not the reverse.