Control and Coordination in Organisms

Question 1:

Select the proper choice from the given multiple choices.

Question 1.1:

What is called the movement of plant toward the gravity ?

Solution :

B. Geotropism

The movement of plant parts in response to the stimulus of gravity is called geotropism.

Question 1.2:

The plant part which exhibits negative geotropism is:

Solution :

B. Stem

Stem of the plant moves in the direction opposite to gravity. This phenomenon is called negative geotropism.

Question 1.3:

The growth of a pollen tube towards the ovule is caused by……

Solution :

D. Chemotropism

The growth of pollen tube is in response to the chemical stimulus by stigma. The movement of the plant part in response to a chemical stimulus is called chemotropism.

Question 1.4:

Bending of the shoot of a plant in response to light is known as……

Solution :

B. Phototropism

The movement of the plant in response to the stimulus of light is called phototropism.

Question 1.5:

The stimulus in the process of thigmotropism is:

Solution :

A. Touch

Thigmotropism is the movement of the plant or parts of the plant in response to the stimulus of touch.

Question 1.6:

Which of the following helps in maintaining posture and balance of the human body?

Solution :

A. Cerebellum

Cerebellum maintains the balance of the body and coordinates body movements like dancing, walking, swimming etc.

Question 1.7:

How many pairs of nerves arise from the spinal cord ?

Solution :

B. 31

Spinal cord is a posterior extension of medulla oblongata. 31 pairs of nerves arise from the spinal cord and help in the transmission of impulses.

Question 1.8:

Cerebellum, medulla oblongata and pons are the parts of:

Solution :

B. Hind-brain

Cerebellum, medulla oblongata and pons are the regions of the brain present in the posterior part of the skull. They together form the hind-brain.

Question 1.9:

For the synthesis of which of the following hormone iodine is necessary ?

Solution :

C. Thyroxine

The hormone thyroxine, secreted by the thyroid gland, contains iodine. Absence or deficiency of iodine in the diet can result in the deficiency of thyroxine in the body.

Question 1.10:

Which of the following is a mismatched pair?

Solution :

A. Adrenaline : Pituitary gland

The hormone adrenaline is secreted by the adrenal glands present above the kidneys.

Question 1.11:

The spinal cord originates from:

Solution :

C. Medulla oblongata

Spinal cord is a posterior extension of the medulla oblongata.

Question 1.12:

Which of the following hormone prepares our body for action in emergency situations ?

Solution :

C. Adrenaline

Adrenaline hormone prepares our body for action in emergency situations. It is also called as fight or flight hormone.

Question 1.13:

Which is male sex hormone ?

Solution :

C. Testosterone

Testosterone is the male sex hormone secreted by the testes.

Question 1.14:

Which of the following endocrine gland does not occur as a pair in the human body ?

Solution :

B. Pituitary

The pituitary gland is located just below the brain. It is known as the master gland and does not occur as a pair in the human body.

Question 2:

Answer the following questions in brief :

Question 2.1:

Name the plant which shows thigmonesty.

Solution :

Mimosa (Touch me not) plant shows thigmonasty.

Question 2.2:

Give the scientific terms used to represent the following:

Bending of a shoot towards light.
Growing of roots towards the earth.
Growing of a pollen tube towards ovule.
Bending of roots towards water.
Winding of tendril around a support.

Solution :

The scientific terms used to represent the following are:

1. Bending of a shoot towards light – Phototropism.
2. Growing of roots towards the earth – Geotropism.
3. Growing of a pollen tube towards the ovule – Chemotropism.
4. Bending of roots towards water – Hydrotropism.
5. Winding of the tendril around a support – Thigmotropism.

Question 2.3:

Give example of the movement of a plant part which is caused by the loss of water.

Solution :

In Mimosa plant, the leaves of the plant fold in response to the stimulus of touch, due to loss of water from that region of the plant.
When the leaves of the plant are touched, the pulvinus which forms the base of the leaflets, generate an electrical impulse. As a result of this impulse, water migrates away from the part of the plant being touched and the leaves fold up.

Question 2.4:

Name the two systems of control and co-ordination in higher animals.

Solution :

The two systems of control and coordination in higher animals are

- Nervous system
- Hormone system

Question 2.5:

Name the three components of a nerve cell.

Solution :

The three components of a nerve cell are

- Cell body
- Axons
- Dendrites

Question 2.6:

Name the most important part of the human brain.

Solution :

Cerebrum is the largest, extremely complex and the most important part of the human brain.

Question 2.7:

State one function each of cerebellum and pons.

Solution :

Functions of cerebellum and pons are:

Cerebellum – It helps to maintain the balance and posture of the body. It also helps to coordinate the bodily movements during activities like dancing, walking, swimming etc.

Pons – It regulates respiration in the human body.

Question 2.8:

Name one hormone secreted by the pituitary gland.

Solution :

Pituitary gland secretes the following hormones:

- Thyroid stimulating hormone (TSH)
- Adreno-corticotropic hormone (ACTH)
- Follicle stimulating hormone (FSH)
- luteinizing hormone (LH)
- Prolactin
- Growth hormone (GH)
- Melanocyte stimulating hormone (MSH)
- Vasopressin
- Oxytocin

(Any one)

Question 2.9:

Where are hormones synthesised in the human body?

Solution :

Hormones are synthesised in specialised glands present in the human body.

Question 2.10:

Which gland secretes the growth hormone?

Solution :

Pituitary gland secretes the growth hormone.

Question 2.11:

Name the disease caused by the deficiency of insulin hormone in the body.

Solution :

Deficiency of the insulin hormone causes diabetes.

Question 3:

Write answers of the following questions :

Question 3.1:

(A) What does a root do in response to gravity ? What is this phenomenon known as?
(B) What does a stem do in response to light? What is this phenomenon known as?

Solution :
A. In response to gravity, the root grows towards the direction of gravity. This phenomenon is known as geotropism.
B. In response to light, the stem grows towards the direction of light. This phenomenon is known as phototropism.

Question 3.2:

(A) What does a stem do in response to gravity? What is this phenomenon known as?
(B) What does a root do in response to light? What is this phenomenon known as?

Solution :
A. In response to gravity, the stem grows opposite to the direction of gravity. This phenomenon is known as negative geotropism.
B. In response to light, the root grows opposite to the direction of light. This phenomenon is known as negative phototropism.

Question 3.3:

(A) What is spinal cord ? What is its main function?
(B) Give the functions of medulla oblongata.

Solution :
A. Spinal cord is a posterior extension of medulla oblongata. It is a cylindrical structure enclosed within the vertebral column. The main function of the spinal cord is to transmit information between the brain and the other parts of the body.
B. Medulla oblongata functions to control reflex actions like coughing, sneezing, blinking of eyes, etc.

Question 3.4:

(A) Name the hormones secreted by the following endocrine glands :
(i) Thyroid gland
(ii) Parathyroid glands
(iii) Pancreas
(iv) Adrenal glands
(B) Write the functions of testosterone and estrogen hormones.

Solution :
A. **Hormones secrete by the following glands:**

- Thyroid gland – Thyroxine
- Parathyroid gland – Parathormone

- Pancreas – Insulin
- Adrenal glands – Adrenalin

B. Testosterone is a male sex hormone. It controls the development of male sex organs and secondary sexual characteristics like deepening of voice, development of the beard and the moustache in males.

Estrogen is a female sex hormone. It controls the development of female sex organs and secondary sexual characteristics like development of feminine voice, soft skin, and mammary glands in females.

Question 3.5:

(A) Write the names of the regions of hind-brain. Give functions of each region.
(B) Mention the functions of cerebrum.

Solution :
1. Regions of the hind-brain and their functions:

- Cerebellum – maintains the balance and the posture of the body and coordinates the body movements like dancing, walking, swimming, etc.
- Pons – regulates respiration in the human body
- Medulla oblongata – functions to control reflex actions

2. Functions of cerebrum:

- Controls vision, hearing
- Perceives sensation like smell, touch and temperature
- Controls voluntary and involuntary muscular activities, speech and memory.

Question 3.6:

What does CNS stand for ?

Solution :
CNS stands for Central Nervous System.

Question 4:

Answer the following questions in detail :

Question 4.1:

(A) What is meant by ‘tropisms’ ? Explain with an example.
(B) Mention types of tropisms. Define each type of tropism. Write the name of stimulus in each case.
(C) How do tropism differ from nastism ?

Solution :
A. Tropism or tropic movement is the movement of plant parts induced by an external and directional stimulus.

Example – Growth of roots towards water is induced by the presence of water. This movement of roots is called hydrotropism.

B. **Different types of Tropisms are:**

- Phototropism – Stimulus – Light
  Movement of the plant part in response to the stimulus of light is called phototropism.
- Geotropism – Stimulus – Gravity
  Movement of the plant part in response to the stimulus of gravitational force of the Earth is called geotropism.
- Chemotropism – Stimulus – Chemicals
  Movement of the plant part in response to the stimulus of the chemical substance is called chemotropism.
- Hydrotropism – Stimulus – Water
  Movement of the plant part in response to the stimulus of water is called hydrotropism.
- Thigmotropism – Stimulus – Touch
  Movement of the plant part in response to the stimulus of touch is called thigmotropism.

C. Tropism differs from nastism in direction of response. In tropism, the direction of response is determined by the direction of stimulus whereas in nastism, the direction of response is not determined by the direction of stimulus.

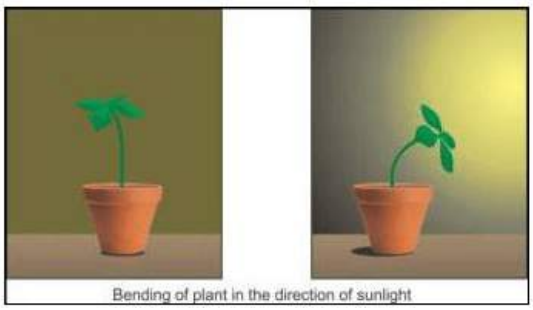
Question 4.2:

(A) Define phototropism and give one example of it.
(B) How does phototropism occur in a plant stem ? Explain with the help of labelled diagrams.
(C) What is meant by positive phototropism and negative phototropism? Give one example of each type.

Solution :
A. Movement of the plant part in response to the stimulus of light is called phototropism.

Example – Stem of the plant grows in the direction of light showing positive phototropism; and roots of the plant grow in the direction opposite to the direction of light, showing negative phototropism.

B. When a plant is kept in a dark room with a source of light at one corner, the stem grows in the direction of light. Thus, we can say that the plant stem shows positive phototropism.


Bending of plant in the direction of sunlight

The hormone auxin controls the growth of the stem in response to light. The tip of the plant which senses light is called coleoptile. When light falls unevenly on the stem, the shady region below the coleoptile elongates due to the action of auxin and growth occurs in the direction of light.

C. Movement of plant part in response to the stimulus of light is called phototropism. When the movement of plant part is in the direction of light, it is called as positive phototropism and when the movement is in the direction opposite to the direction of light, it is called as negative phototropism.

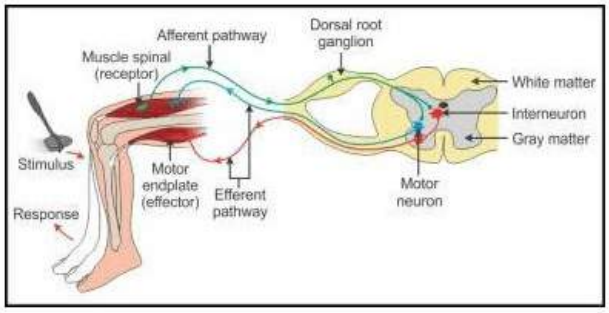
Example – Stem shows positive phototropism and roots show negative phototropism.

Question 4.3:

(A) Name the structural and functional unit of nervous system.
(B) What is autonomus nervous system? What is its function?
(C) What is voluntary nervous system? Explain the working of voluntary nervous system with an example.

Solution :

1. The structural and functional unit of the nervous system is a nerve cell.
2. Autonomous nervous system means a self governing nervous system. The nervous system is responsible for governing the involuntary actions in the human body. It controls and regulates processes like breathing, heartbeat, digestion, excretion etc.
3. Voluntary nervous system also known as somatic nervous system is a part of the peripheral nervous system which controls voluntary actions of the body through skeletal muscles. The process through which the voluntary nervous system executes its control is known as reflex arc.Example – Kneejerk is an example of voluntary nervous system. When any stimulus strikes the patella or the region below it, it triggers an impulse in the sensory neuron. The sensory neuron transmits this information to the spinal cord. The spinal cord processes the information and passes an impulse to the effector neuron. The effector neuron transmits the impulse to the muscle of the leg, producing contraction of the leg muscle. As a result of contraction of the leg muscle, the lower part of the leg lengthens or stretches.



Question 4.4:

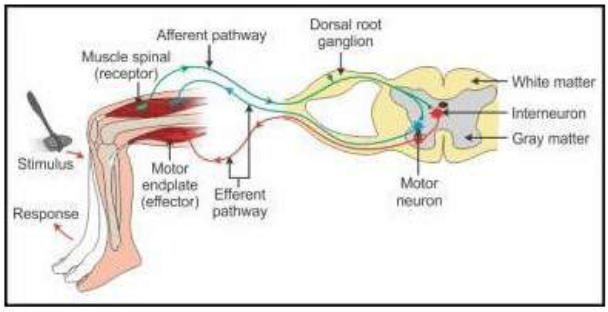
(A) What is a reflex action ? Explain with the help of an example.
(B) How involuntary actions and reflex actions differ from each other?

Solution :

1. Reflex action is a simple, rapid, autonomic response without any thinking. Kneejerk, coughing, sneezing, pulling of hand on pricking or touching a hot object are examples of reflex action.

- Let us understand a reflex action with the help of a kneejerk.
- When any stimulus strikes the patella or the region below it, it triggers an impulse in the sensory neuron. The sensory neuron transmits this information to the spinal cord.

The spinal cord processes the information and passes an impulse to the effector neuron. The effector neuron transmits the impulse to the muscle of the leg producing contraction of the leg muscle. As a result of contraction of the leg muscle, the lower part of the leg lengthens or stretches.



- Thus, we can see that on receiving a stimulus on the knee, the leg stretches immediately. This is a reflex action.

2. The basic difference between involuntary and reflex action is that the involuntary actions are the actions controlled directly by the brain and the reflex actions are the ones controlled by the spinal cord.

Question 4.5:

(A) Write the names of five endocrine glands found in the human body. Name the hormones secreted by each gland.
(B) Name the gland which controls the secretion of hormones of pituitary gland.
(C) How does our body respond when adrenaline is secreted in large amounts into the blood?
(D) Name the disease which occurs in adults due to the deficiency of iodine in the diet. What is the main symptom of this disease ?

Solution :

1. Endocrine glands found in the human body and enzymes secreted by them are as follows:

Endocrine gland	Enzyme secreted
Hypothalamus	Releasing hormones
Pituitary Gland	Thyroid stimulating hormone (TSH) Adreno-corticotropic hormone (ACTH) Follicle stimulating hormone (FSH) Luteinizing hormone (LH) Prolactin Growth hormone (GH) Melanocyte stimulating hormone (MSH) Vasopressin Oxytocin
Pancreas	Insulin
Thyroid Gland	Thyroxine

Parathyroid Gland	Parathormone
Adrenal Gland	Adrenaline
Testis (In males only)	Testosterone
Ovary (In females only)	Estrogen Progesterone

2. Hypothalamus controls the secretion of the Pituitary gland.
3. Large amount of adrenaline is released in the blood stream during emergency situations. It increases the speed and strength of the person during emergency. Thus, the body is prepared to fight or run away with a greater speed.
4. Deficiency of iodine in human diet can result in a disease called goitre. It is a disease caused due to enlargement of the thyroid gland. Swelling in the neck region due to enlargement of the thyroid gland is a symptom of goitre.