

Control and Co-ordination



NCERT
Exercises (Questions-Solutions)

Intext Questions

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

Ans. Reflex action is an unconscious, involuntary response of our body to external stimulus, *i.e.*, reflex actions are not under our control. On the other hand, walking is a conscious movement and is under our control. Reflex actions are controlled by the spinal cord, whereas walking is controlled by brain.

2. What happens at the synapse between two neurons?

Ans. The nerve impulses are carried out by a small gap called synapse between a pair of neurons by means of a neurotransmitter, when the nerve impulse travelling through the first neuron reaches the axon endings. It releases tiny amount of a chemical substance into the synapse. This chemical substance crosses the gap and starts a similar electrical impulse in the dendrite of the next neuron. From dendrite, the nerve impulse is carried to the cell body and then to the end. It can then be transferred to the third neuron in a similar way. This process continuous till the electrical impulse reaches the brain or spinal cord.

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

Ans. Cerebellum is the part of hindbrain. It coordinates the voluntary movements and controls equilibrium and posture of the body.

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

Ans. Tip of special nerve cells present in our nose cells called **olfactory receptor** which detect the smell of incense stick and deliver it to the special part of the brain through the sensory neuron. In this way, the smell of agarbatti is detected by us.

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

Ans. Reflex actions are simplest responses to an external stimulus which are not under our control and are controlled by the spinal cord. For example, when we touch a hot plate, we immediately remove our hand without thinking. Though, spinal reflexes are produced in the spinal cord, but the message of reflex action taken also goes on to reach the brain. For any reflex action, various organs are involved, though the message to react is send by the spinal cord, but the activity of various organs to carryout the response is coordinated by brain.

Note Besides, some reflexes involve brain, rather than spinal cord only. They are called spinal reflexes. The contraction of pupil of our eye automatically in the presence of bright light is an example of cerebral reflex.

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1. What are plant hormones?

Ans. Certain chemical substances present in plants that control and coordinate various activities of plants are called plant hormones or phytohormones.

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

Ans. The main differences between the movement of leaves of a sensitive plant and movement of a shoot towards light are as follows:

| S. No. | Movement of Leaves to Sensitive Plant | Movement of Shoot Towards Light |
|--------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 1. | It is a nastic movement which does not depend on the direction of stimulus applied. | It is tropic movement which depends on the direction of stimulus applied. |
| 2. | The stimulus is touch. | The stimulus is light. |
| 3. | It is caused by the sudden loss of water from the swellings at the base of leaves. | It is caused by the unequal growth on the two sides of the shoot. |
| 4. | It is not a growth movement. It is very fast. | It is a grow movement. It is a slow movement. |

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

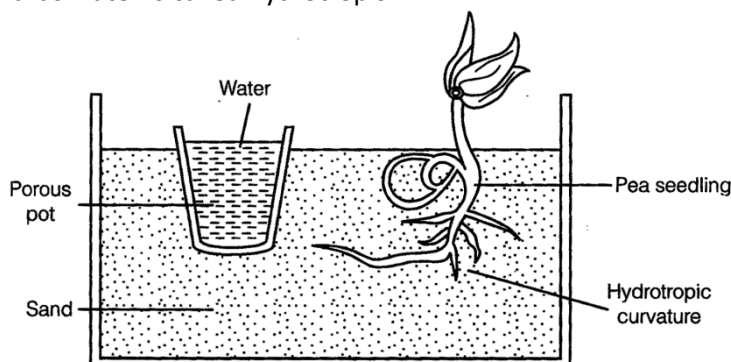
Ans. Auxin (and also gibberellin, but gibberellins promote growth only in the presence of auxins).

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

Ans. When the tip of tendrils touches a support, then the auxins present in its tip move to that side which is away from the support. Auxins promote growth. So, due to more auxins in it, the side of tendril away from the support grows faster and becomes longer than the side which is in contact with the support and makes the tendril curve and bend towards the support. This curving tendril can then encircle the support and ling around it.

5. Design an experiment to demonstrate hydrotropism.

Ans. The growth of roots towards water is called hydrotropism.



Take a plant (pea seedling) in a nude jar filled with sand. Now place a porous pet filled with H_2O in the wide jar. Roots of the plant will green towards H_2O and bond towards the H_2O source showing hydrotropism.

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1. How does chemical coordination take place in animals?

Ans. Chemical coordination in multicellular organisms take place through the special chemical substances called hormones, which are produced in endocrine glands. These chemicals unlike nerve cells, reach all the cells of the body and bring about desirable changes as instructed by the brain and spinal cord. This is done by using a hormone named adrenaline. It is directly secreted into the blood and carried to different parts of the body.

The heart, beats faster to supply more oxygen to our muscles. The breathing rate also increases. All these responses enable the animal body to be ready to face the situation. Such hormones constitute a second way of control and coordination.

2. Why is the use of iodised salt advisable?

Ans. Thyroid gland produces a hormone called thyroxine which controls the rate of metabolism of carbohydrates, fats and proteins in the body. Iodine is necessary for making thyroxine hormone by thyroid gland, therefore, the deficiency of iodine in diet causes deficiency of thyroxine which results into a disease known as goitre. Iodised salt contains appropriate amount of iodine compounds which provide all the iodine needed by the thyroid gland to make sufficient thyroxine.

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

Ans. Adrenalin hormone is secreted in small amount all the time but in large amount, when a person is frightened. As a result, the heart beats faster to supply more oxygen to our muscles. The blood supply to the digestive system and skin is reduced and more blood is diverted to our muscles. The breathing rate also increases. It also allows more glucose to go into the blood to give us a lot of energy quickly to fight or run away from the frightening situation. Therefore, it is often called emergency hormone.

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

Ans. In patients suffering from diabetes, the pancreas stops producing insulin, due to which their blood sugar level increases. In such cases, artificial insulin helps to bring down the blood sugar level.

Exercises Questions

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1. Which of the following is a plant hormone?

- (a) insulin (b) thyroxine (c) oestrogen (d) cytokinin

Ans.: Cytokinin.

2. The gap between two neurons is called a

- (a) dendrite (b) synapse (c) axon (d) impulse

Ans.: Synapse.

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3. The brain is responsible for

- (a) thinking (b) regulating the heart beat
(c) balancing the body (d) all of these.

Ans.: All of these.

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?

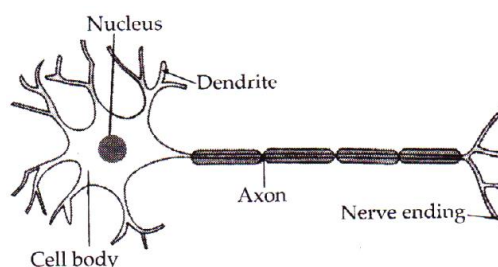
Ans.: The receptors in our body collect information about changes in the environment around us in the form of stimuli. They are located in our sense organs such as the inner ear, nose, tongue, eye, etc. These then pass

the information in the form of nerve impulses to central nervous system (spinal cord and brain) where message is interpreted and instructions are sent to effectors which reveal responses.

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.

Ans.: Functions- The information acquired at the end of the dendritic tip of a neuron sets off a chemical reaction which creates an electrical impulse. The impulse travels from the dendrite along the axon of its end. At the end of axon/ the electrical impulse sets off the release of some chemicals, which cross the synapse and start a similar impulse in a dendrite of the next neuron.



In this way nerve impulses travel in the body. Thus, nervous tissue is made up of an organized network of neurons which are specialized for conducting information via electrical impulse from one part of the body to another.

6. How does phototropism occur in plants?

Ans.: Phototropism is a directional growth which occurs in response to unidirectional exposure to light. Phototropic movement is generally caused by increased auxin on the dark side and lesser auxin on the illuminated side. Due to the presence of more auxin, the part of the plant stem in the dark grows faster, causing it to bend towards the source of light.

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

Ans.: The following signals will get disrupted in case of a spinal cord injury:

- Reflex action
- Impulses from various body parts will not be conducted to brain.
- Message from brain will not be conducted to various organs of the body.

8. How does chemical coordination occur in plants?

Ans.: In plants, chemical coordination occurs by plant hormones or phytohormones; Plant hormones are chemical substances other than nutrients, which are produced at specific places in the plant (usually from tips of shoots, roots and branches), and then are diffused to a specific site without translocation to other sites. Phytohormones produce effects like cell multiplication, growth, opening of flowers and regulate physiological processes.

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

Ans.: The body of a multicellular organism consists of a number of components and sub-components and each is specialized to perform a particular function. Therefore, it is necessary that various organs of the body of an organism work together in a proper manner for proper functioning to a stimulus. In human beings nervous system and endocrine system work together for control and coordination.

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

Ans.: Involuntary action

- (i) Involuntary action involves autonomic nervous system.
- (ii) They occur in response to internal stimuli,
- (iii) They are connected with functioning of internal body parts.
- (iv) It occurs without the will of the organism. For example, heart beat, breathing, etc.
- (v) These are regulated by medulla oblongata (hind brain).

Reflex action

- (i) Reflex action involves all parts of voluntary nervous system though they are not voluntary,
- (ii) They operate against harmful stimuli which are generally external.
- (iii) They are connected with emergency i.e., response to stimuli.
- (iv) Some reflexes involve the brain, rather than the spinal cord.
- (v) Reflex is generally controlled by spinal cord.

11. Name the organism which lacks nervous system.

Ans.: Plants lack nervous system.

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

Ans.: The differences between movement in a sensitive plant and the movement in our legs are given below:

| S. No. | Movement in a sensitive plant | Movement in legs |
|--------|------------------------------------------------------------------------------|---------------------------------------------------------------|
| 1. | It occurs in response to an external stimulus like touch, pressure or shock. | It occurs voluntarily in response to our need and will. |
| 2. | It is brought about by turgor changes in specific cells. | It is brought about by contraction and relaxation of muscles. |
| 3. | It is controlled by plant hormones. | It is controlled by cerebellum of the hind brain. |

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

Ans.:

| S. No. | Nervous System | Endocrine System (Hormonal System) |
|--------|----------------------------------------------------------|----------------------------------------------------------------|
| 1. | Made of neurons or nerve cells. | Made of secretory cells and glands. |
| 2. | Messages transferred in the form of electrical impulses. | Messages transferred in the form of chemicals called hormones. |
| 3. | Messages transferred along the nerve fibres. | Messages transmitted through blood system. |
| 4. | Messages travel very quickly. | Messages travel slowly. |
| 5. | Effect of message usually last for a very short time. | Effect of message usually lasts longer. |



NCERT

Exemplar

(Problems-Solutions)

Multiple Choice Questions (MCQs)

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

- (a) Gustatory receptors detect taste while olfactory receptors detect smelt
- (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

Ans. (a) A receptor is a cell (or a group of cells) in a sense organ which is sensitive to a particular type of stimulus such as light, sound, etc.

The common type of receptors are

- (i) Photoreceptors (in eyes) detect light
- (ii) Gustatory receptors (in tongue) detect taste
- (iii) Olfactory receptors (in nose) detect smell
- (iv) The rmoreceptors (in skin) detect heat or cold.

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

Ans. (c) The neurons carry messages in the form of electrical signals called electrical impulses or nerve impulses. The dendrites pick up the impulses from receptor and pass them to the cell body, and then along the axon to its end. At the axonal end, electrical impulse sets off release of some chemicals that crosses the gap or synapse and start a similar impulse in dendrite of the next neuron.

3. In a synapse, chemical signal is transmitted from

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

Ans. (d) A microscopic gap between a pair of adjacent neurons over which nerve impulses pass when going from one neuron to the next is called synapse.

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

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

Ans. (b) At the axonal end, the electrical impulse releases small amount of chemical substance (i.e., acetylcholine) into the synapse. This chemical substance crosses the gap and starts a electrical impulse in the dendrite of next neuron.

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

Ans. (d) The pathway taken by nerve impulse in a reflex action is called the reflex arc. A reflex action is involuntary action in response to a stimulus, e.g., coughing, sneezing etc.

It follows a specific pathway as given below

Stimulus → *Receptors* → *Spinal cord* → *Effector* → *Receptors*
Sensory neurons (Muscle/Gland)

6. Which of the following statements are true?

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

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

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

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

(a) (i) and (ii) (b) (i) and (iii) (c) (i) and (iv) (d) (i) (ii) and (iii)

Ans. (c) The (ii) statement is false as sensory neurons carry signals from receptors to spinal cord.

The (iii) statement is false as motor neurons carry signals from spinal cord to effectors.

7. Which of the following statements are true about the brain?

(i) The main thinking part of brain is hind brain.

(ii) Centres of hearing, smell, memory, sight, etc., are located in fore brain.

(iii) Involuntary actions like salivation, vomiting, blood pressure are controlled by the medulla in the hind brain.

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

(a) (i) and (ii) (b) (i) (ii) and (iii) (c) (ii) and (iii) (d) (iii) and (iv)

Ans. (c) The cerebrum (part of forebrain) is the main thinking part of the brain. It coordinates the voluntary actions of the body. It has different areas for performing different functions such as centres of hearing, smell, memory, etc.

The hindbrain consists of pons (takes part in regulating respiration), cerebellum (helps in maintaining posture and balance of body) and medulla that controls involuntary actions such as breathing etc. The midbrain controls reflex movements.

8. Posture and balance of the body is controlled by

(a) cerebrum (b) cerebellum (c) medulla (d) pons

Ans. (b) Cerebellum controls the voluntary actions, e.g., posture.

9. Spinal cord originates from

(a) cerebrum (b) medulla (c) pons (d) cerebellum

Ans. (b) Spinal cord is a cylindrical structure enclosed in a bony cage called vertebrae. Column.

It begins in continuation with medulla and extends downwards.

10. The movement of shoot towards light is

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

Ans. (d) A growth movement of a plant part in response to an external stimuli, towards or away from it is called tropism.

Common stimuli in environment are as given in table below

| Stimulus | Type of Tropism |
|----------|-----------------|
| Light | Phototropism |
| Gravity | Geotropism |

Touch Thigmotropism
Chemical 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 growth of stem

Ans. (c) The main function of abscisic acid in plants is to inhibit growth. The other plant hormones with their functions are given in the table below

| Phytohormone | Function |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Auxins | Promote cell elongation, root formation, cell division and other physiological processes |
| Gibberellins | Stimulate stem elongation, stem germination and flowering (opposite effect of ABA) |
| Cytokinins | Promotes cytokinesis, also helps in breaking dormancy and regulating phloem transport. |
| Absciscic acid | Growth inhibitor, causes dormancy of seeds, etc. promotes leaf and fruit fall, helps in stomata closing to prevent loss of H ₂ O. |
| Ethylene | Promotes transverse growth, senescence, abscission of leaves, etc. |

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

- (a) Auxin (b) Gibberellins (c) Cytokinins (d) Absciscic acid

Ans. (d) Absciscic acid is a growth inhibitor hormone, it reverses the growth promoting effects of auxins and gibberellins. It causes dormancy of seeds, wilting of leaves, closing of stomata, etc.

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

- (a) Adrenaline (b) Thyroxine (c) Auxin (d) Insulin

Ans. (b) Iodine is necessary for the synthesis of thyroxine hormone, deficiency of it in the diet of a person produces less thyroxine hormone and causes a disease known as goitre.

The main symptom of goitre is that the neck of the person appears to be swollen (due to the enlargement of thyroid gland situated in the neck).

14. Choose the incorrect statement about insulin

- (a) it is produced from pancreas (b) it regulates growth and development of the body
(c) It regulates blood sugar level (d) Insufficient secretion of insulin will cause diabetes

Ans. (b) **Pancreas** secrete the hormone insulin. Its function is to regulate blood sugar level; Deficiency of insulin causes a disease known as diabetes that is characterized by large quantities of sugar in blood and even urine. Growth hormone secreted by the pituitary gland regulates growth and development of body.

15. Select the mis-matched pair

- (a) Adrenaline-Pituitary gland (b) Testosterone-Testes
(c) Estrogen-Ovary (d) Thyroxine-Thyroid gland

Ans. (c) Adrenaline is secreted by the adrenal glands, located on top of kidneys. Growth hormone is secreted by the pituitary gland

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

- (a) protein composition of cells (b) temperature of cells

(c) amount of water in cells (d) position of nucleus in the cells

Ans. (c) The shape of guard cells changes due to amount of water in them. The guard cells swell when water flows into them, causing the stomatal pore to open. Similarly, the pore closes if the guard cells shrink, due to the loss of water in them.

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

Ans. (c) Tendrils are the thin thread-like growths on the stem or leaves of climbing plants.

These are sensitive to touch of other objects (i.e., thigmotropic). When a tendril touches an object, then the side in contact with object grows slowly than its other side, (i.e., rapid cell divisions in cells that are away from the support).

This causes the tendril to bend towards the object by growing towards it, wind around object and cling to it.

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

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

Ans. (b) The growth of a pollen tube towards ovule is induced by a chemical (sugar) substance secreted by the ripened stigma of flower into the style towards ovary.

It is an example of chemotropism, pollen grain responds to stimulus by growing a pollen tube in downward direction, towards ovule for fertilization.

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

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

Ans. (a) The movement of a plant part in response to light is called phototropism

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

Ans. (c) Abscisic acid is responsible for the formation of layer of abscission. This layer disconnects the living tissue of leaf from the other parts.

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

- (a) Nerve impulse travels from dendritic end towards 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

Ans. (b) The information acquired at the end of the dendritic tip of a neuron causes a chemical reaction that produces an electrical impulse. This impulse travels from dendrite to cell body and then along axon to its end.

22. Involuntary actions in the body are controlled by

- (a) medulla in fore brain (b) medulla in mid brain
- (c) medulla in hind brain (d) medulla in spinal cord

Ans. (c) Medulla is part of hind brain. It controls the involuntary action and regulates reflex responses. The other parts of hind brain are cerebellum and pons.

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

- (a) Vomiting (b) Salivation (c) Heart beat (d) Chewing

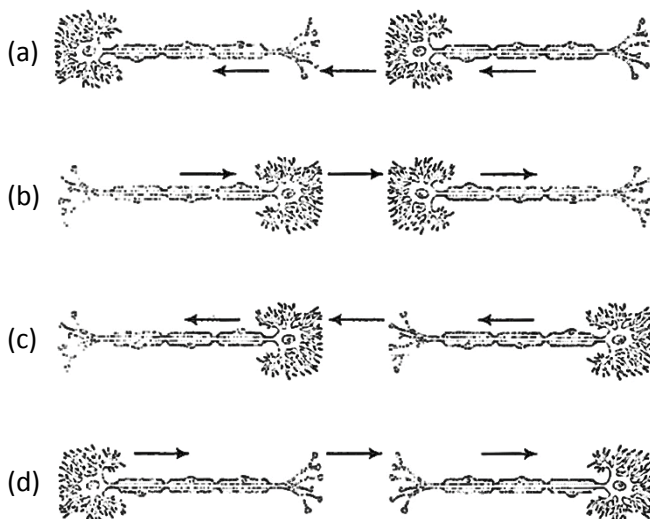
Ans. (d) Involuntary actions are those actions that are not under our direct control such as heart beat, breathing, peristaltic movements, etc. These are controlled by medulla. Chewing is under voluntary control and controlled by lobes present in cerebral cortex.

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.

Ans. (b) During cold, mucus in nasal passages becomes too thick, so that odour molecules can't reach the olfactory receptor cells. Thus, brain receives no signal identifying the odour, and so the smell of a perfume cannot be differentiated from that of an agarbatti.

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



Ans. (c) Direction of flow of electrical impulse.

Impulse → Dendrite → Cell body → Axon → Release of chemicals that cross synapse → Dendrite of next neuron

26. Which statement is not true about thyroxine?

- (a) Iron is essential for the synthesis of thyroxine
(b) It regulates carbohydrates, protein and fat metabolism in the body
(c) Thyroid gland requires iodine to synthesize thyroxine
(d) Thyroxine is also called thyroid hormone

Ans. (a) Iodine is essential for synthesis of thyroxine.

27. Dwarfism results due to

- (a) Excess secretion of thyroxine
(b) Less secretion of growth hormone
(c) Less secretion of adrenaline

(d) Excess secretion of growth hormone

Ans. (b) Deficiency of growth hormone in childhood causes dwarfism while excessive secretion causes gigantism. Deficiency of thyroxine causes goitre.

Adrenaline is secreted in small amounts all the time but is secreted in large amounts to prepare our body for action during flight or fight.

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

Ans.

| Gland | Hormone | Function |
|------------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------|
| Testes (only in males) | Testosterone | To control the development of male sex organs and male features as deep voice, etc., i.e., changes associated with puberty. |
| Ovaries (only in females) | Oestrogen | To control the development of female sex organs and female features as soft skin, etc. |
| | Progesterone | To control uterus changes during menstrual cycle and helps in maintenance of pregnancy. |

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

Ans. (d) The person having high sugar level in blood is called a diabetic. Such persons are advised to take less sugar in diet, reduce weight, exercise regularly. Persons with severe diabetes (high sugar level in blood) are treated by giving injections of insulin.

30. The hormone which increase the fertility in males is called

- (a) oestrogen
- (b) testosterone
- (c) insulin
- (d) growth hormone

Ans. (b) Testosterone is the male sex hormone. It regulates male accessory sex organs. It is responsible for secondary sexual characters like moustache, beard, etc., thus, increasing fertility in males.

31. Which of the following endocrine glands is unpaired?

- (a) Adrenal
- (b) Testes
- (c) Pituitary
- (d) Ovary

Ans. (c) There are two adrenal glands, one on top of each kidney that make adrenaline hormone. Testes are paired glands presents in males, secretes male sex hormone. Pituitary gland is present just below the brain and is unpaired. It is also called master gland as it secretes a number of hormones. Ovaries are paired glands present in females, secretes female sex hormones.

32. Junction between two neurons is called

- (a) cell junction
- (b) neuro muscular junction
- (c) neural joint
- (d) synapse

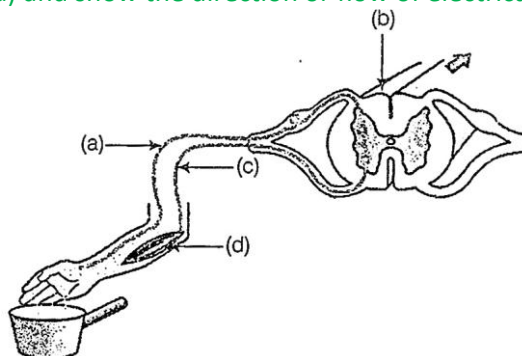
Ans. (d) Junction between two neurons is coiled synapse.
 Cell junction - junction between neighbouring cells
 Neuromuscular junction-connects nervous system to muscular system

33. In humans, the 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

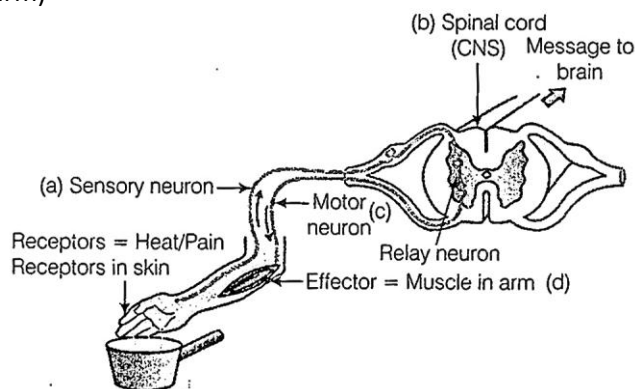
Ans. (d) In human beings, nervous system and endocrine system work together to control and coordinate all the activities. Both these systems consist of a number of organs that work together in a systematic way

Short Answer Type Questions

34. Label the parts (a), (b), (c) and (d) and show the direction or flow of electrical signals in given figure.



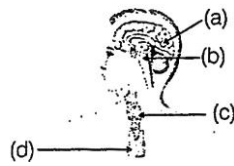
Ans. (a) Sensory neuron
 (b) Spinal cord (CNS)
 (c) Motor neuron
 (d) Effector (muscle in arm)



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

Ans. (a) Auxin-elongation of cells
 (b) Gibberellin-growth of stem
 (c) Cytokinin-promotion of cell division
 (d) Absciscic acid-falling of senescent leaves

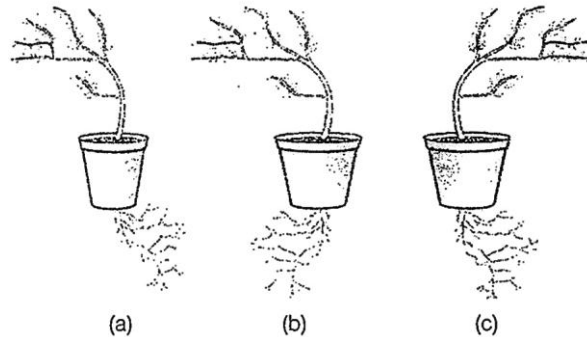
36. Label the endocrine gland in figure



Ans. The endocrine glands and its location are as follow

| Glands | Location |
|---------------------|------------------------------------------------|
| (a) Pineal gland | Attached to dorsal side of brain |
| (b) Pituitary gland | Just below the brain |
| (c) Thyroid gland | Attached to the windpipe |
| (d) Thymus | Lower part of the neck and upper part of chest |

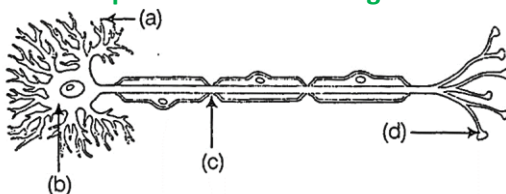
37. In figure (a), (b) and (c), which appears more accurate and-why?



This is a case of geotropism, i.e., response of plants to gravity.

Ans. Figure (a) is more accurate. The roots of a plant always grow downwards in response the gravity to make sure they find soil and water. On the other hand, the stem always grows up away from gravity pull to make sure they will get light. Both these conditions are shown in figure (a).

38. Label the part of a neuron in Figure below.



Ans. (a) Dendrite (b) Cell body
(c) Axon (d) Nerve ending

39. Match the terms of column I with those of column II.

| Column I | Column II |
|-------------------------------------------------|-----------|
| A. Olfactory receptors | 1. Tongue |
| B. Thermo receptors (temperature receptors): | 2. Eye |

- | | |
|---------------------|---------|
| C. Gustatoreceptors | 3. Nose |
| D. Photoreceptors | 4. Skin |

Ans. The matching of the column I with column II

| Column I | Column II |
|------------------------|-----------|
| A. Olfactory receptors | Nose |
| B. Thermo receptors | Skin |
| C. Gustatoreceptors | Tongue |
| D. Photoreceptors | Eye |

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

Ans. The movement of a plant in the direction of a stimulus or away from it is called tropic movement or tropism. It is said to be positive if it is directed towards the source of stimulus and negative if directed away from the source stimulus. e.g., geotropism, the tropic response towards gravity. When a growing portion of a plant is placed horizontally, the stem tip grows away from the pull of gravity. While the root tip grows towards it. Thus, the stem is said to be negatively geotropic and the root positively geotropic.

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



Iodine (5 necessary for the thyroid gland to make thyroxin hormone.

Ans. When iodine intake is low, following may happen

- (a) Release of thyroxin from thyroid gland will be less. This will affect the metabolism of carbohydrate, protein and fat and thus slow down the growth of body
- (b) A person might suffer from goitre. One of the symptom of this disease is a swollen neck

42. What happens at the synapse between two neurons?



The gap between the ending of an axon (synoptic terminals) and the dendrite of another neuron is called a **synapse**. A chemical substance is released at axonal end that passes through it.

Ans. When an electrical impulse reaches the end of the axon, it causes the axon bulb to release a chemical which diffuses across the synapse and stimulates the dendrites of adjacent neuron. These dendrites in turn send electrical signals to their cell body to be carried along the axon.

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?

Ans. (a) Oestrogen At the onset of puberty in females, the ovaries begin to secrete this hormone. It produces secondary sexual characters in females and prepares the body for pregnancy.
 (b) Growth Hormone It is secreted by the anterior lobe of pituitary, it promotes growth and development of body.

(c) **Insulin** It is secreted by pancreas. It controls the rate of oxidation of glucose, helps liver and muscle (cells to absorb glucose from the blood).

(d) **Thyroxine** it is secreted by the thyroid gland. It regulates the carbohydrate, protein and fat metabolism in the body.

44. Answer the following

(a) Name the endocrine gland associated with 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?

Ans. (a) **Pituitary** Hypothalamus gland present in brain releases hormones that regulate the secretion of pituitary glands.

(b) **Pancreas** It is a digestive gland as well as it secretes the pancreatic juice for digestion of food. It also secretes hormones as insulin.

(c) **Adrenal** Adrenal glands are located on the top of two kidneys.

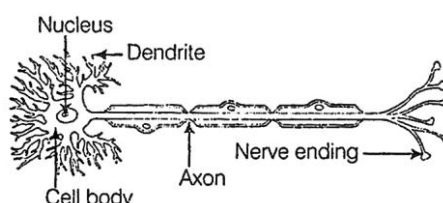
(d) **Testes** These are the glands which are present only in males and secretes male sex hormone, testosterone.

Long Answer Type Questions

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

Ans. Neurons or nerve cells are the units which make up the nervous system. These are the structural and functional unit of the nervous system. It is the largest cell in the body. It carry messages over large distance in the body quickly. The messages are in the form of electrical signals called electrical impulses or nerve impulses.

A neuron is shown in figure below



A neuron (or nerve cell) has three components

(i) **Cell body** It contains cytoplasm and a nucleus

(ii) **Dendrites** These are shorter fibres on the body of a neuron.

(iii) **Axon** The longest fibre on cell body of a neuron.

The axon has an insulating and protective sheath of myelin around it. A number of long and thin fibres stretch out from the cell body of a neuron called nerve fibres.

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

Ans. Brain is the most important coordinating centre in the body. It has three major parts or regions namely the fore-brain, mid-brain and hind-'brain.

| Parts | Functions |
|----------------------|------------------------------------|
| Fore-brain | |
| Cerebrum | Main thinking part of the brain |
| Cerebral hemispheres | Intelligence and voluntary actions |

| | |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Olfactory lobes | Centres of smell |
| Diencephalon | Has centres of hunger, thirst, etc |
| Motor areas | Instructs muscles to do various types of jobs |
| Mid-brain | |
| Tectum | Controls reflex movements of the neck, head and trunk in response to visual and auditory stimuli |
| Cerebral peduncle | Also controls the reflex movements of the 'eye muscles, changes in pupil size and shape of the eye lens |
| Hind-brain | |
| Pons | Regulate respiration Relays information between the cerebellum and the cerebrum Maintaining posture and balance of the body |
| Cerebellum | Enables us to make precise and accurate movements |
| Medulla | Controls involuntary actions as breathing, etc Controlling centre for reflexes such as swallowing, coughing, vomiting, etc |

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

Ans. The central nervous system consists of the brain and the spinal cord

(i) **Brain** It is the main coordinating centre in the body It is lodged in the **brain box** or **cranium** which protects it. It is covered by membranes called **meninges**, which also help to protect it. The space between the membranes and the brain is filled with a **cerebrospinal fluid** which protect the brain from mechanical shock. The brain is broadly divided into three regions fore-brain, mid-brain and hind-brain.

(ii) **Spinal cord** It is a long cylindrical structure. It begins from the medulla oblongata and extends downwards. It is enclosed in a bony cage called **Vertebral column** that protects it. It is also surrounded by meninges. It is concerned with spinal reflex actions and conduction of nerve impulses to and from the brain.

Peripheral Nervous System (PNS)

It includes the following

(i) **Cranial nerves** 12 pairs that emerge from the brain.

(ii) **Spinal nerves** 31 pairs that arise from the spinal cord and spread throughout the body.

(iii) **Visceral nerves** They are special kind of nerves mostly arise from the spinal cord and are connected to the internal organs of the body. They carry both sensory and motor neurons. The PNS works according to our will, i.e., it is related to voluntary acts.

48. Mention one function for each of these hormones

(a) Thyroxin

(b) Insulin

(c) Adrenaline

(d) Growth hormone

(e) Testosterone

Ans.

| Hormone | Function |
|--------------------|-----------------------------------------------------------------------------------------------------------------|
| (a) Thyroxin | It regulates carbohydrate, protein and fat metabolism in the body so as to provide the best balance for growth. |
| (b) Insulin | It helps in regulating blood sugar levels. |
| (c) Adrenaline | Increases heart rate and supply of blood to various organs. |
| (d) Growth hormone | It regulates growth and development in the body. |
| (e) Testosterone | Controls the changes of body features associated with puberty in male. |

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

Ans.

| Plant hormone | Physiological effect |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A. Auxin | <ul style="list-style-type: none">• Synthesized in the young tip of roots and shoots. It diffuses towards the shady side of plant which stimulates the cells to grow longer, resulting in bending of shoot toward light• Promotes cell elongation and division• Play important role in formation of root and seedless fruit |
| B. Gibberellin | <ul style="list-style-type: none">• Help in growth of stem and flower• Help in germination of seed |
| C. Cytokinins | <ul style="list-style-type: none">• Promote cell division and delay leaf ageing• Also stimulate leaf expansion |
| D. Abscissic Acid | <ul style="list-style-type: none">• Growth inhibitor• Reverses the growth promoting effects of auxins and gibberellins |
| E. Ethylene | <ul style="list-style-type: none">• Promotes transverse growth• Essential for fruit ripening, promotes senescence and abscission of leaves |

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

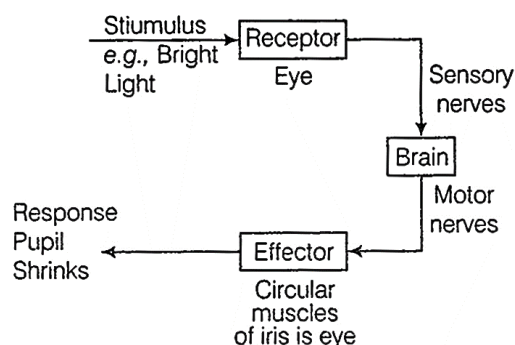
Ans. Reflex action is a rapid, automatic response to a stimulus which is not under the voluntary control of the brain i.e., it is an involuntary action. It is a simple form of behaviour in which the same stimulus produces the same response every time. e.g.,

(i) If we unknowingly touch a hot plate, we immediately move our hand away from it.

(ii) Moving our foot away on stepping something sharp

Other examples are knee jerk, coughing, yawning, sneezing etc.

The pathway taken by nerve impulse in a reflex action is called the reflex arc



Reflex arcs have evolved in animals because the thinking process of brain is not fast enough. However, even after complex neuron networks have come into existence, reflex are continue to be more efficient for quick responses.

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



Receptors → Nervous system → Effector (Glands/muscles) Release of Hormone

- Ans. The working together of various organs of human being in a systematic, controlled and efficient way to produce a proper response to various stimuli is known as coordination. In humans, the nervous and hormonal system together perform this control and coordination.

Nervous System consists of **receptors** that receives the **stimulus** from surrounding environment and send the message conveyed by them to the **spinal cord** and **brain** in form of electrical impulses through the **sensory nerves**. The **motor nerves** then transmit the response to the '**effector**'. The effector are mainly the muscles and glands of our body,

Thus, **endocrine glands** secreting **hormones** are directly or indirectly controlled by the nervous system.

Hence, control and coordination in humans (or animals) depends on two things for transmitting information i.e., chemical signals of hormones and nerve impulses.

If they depended only on nerve impulses through nerve cells, a limited range of tissues would be stimulated. Since, they get additional chemical signals as well, a large number of tissues are stimulated. This is why animals can show a wide - range of response to stimulus.

52. How does chemical coordination take place in animals?

- Ans. Chemical coordination in animals is performed by hormones that are chemical messengers. Different endocrine glands secrete different hormones to regulate various processes.

These hormones are released into the blood which carry them to specific tissues or organs called target tissues/organs. In the target tissue, hormone triggers a particular biochemical or physiological activity.

The hormones are of different types and perform different function. Their timing of release and their amount is gulated by feedback mechanism.

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



When an electrical signal reaches the axonal end of a neuron, it releases a chemical substance.

Ans. The synapse actually act like a one-way valve because the chemical substance is present only on one side of the gap. This chemical diffuses towards the dendrite end of next neuron where it generates an electrical signal.

Since, the chemicals are absent at the dendritic end of neuron, the nerve impulse can go across only from one side (which contains the chemical substance). In this way, it is ensured that nerve impulses travel in only one direction (through of particular set of neurons).