Control and Coordination

TOPIC COVERED

Animals – Nervous System

Multiple Choice Questions **1 Mark**

1. **Which part of a nerve cell contains a nucleus?**
   (*a*) Axon (*b*) Dendrite
   (*c*) Cyton (*d*) Nerve endings
2. **Reflex arc is formed by**
   (*a*) muscle → brain → receptor
   (*b*) muscle → spinal cord → receptor
   (*c*) receptor → brain → muscles
   (*d*) receptor → spinal cord → muscle
3. **Which of the following tissues provide control and coordination in animals?**
   (*a*) Nervous and Skeletal
   (*b*) Muscular and Skeletal
   (*c*) Muscular and Transport
   (*d*) Nervous and Muscular
4. **A student accidentally places her hand on a flame of candle and quickly pulls her hand away. The flame represents**
   (*a*) a response (*b*) a stimulus
   (*c*) an impulse (*d*) an effector

5. **How many pairs of cranial nerves are present in man?**
   (*a*) 12 (*b*) 21 (*c*) 31 (*d*) 41

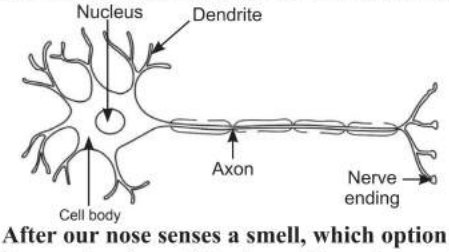
6. **Reflex actions are mediated through**
   (*a*) brain (*b*) effectors
   (*c*) spinal cord (*d*) receptors

7. **Synapse is defined as a**
   (*a*) gap between two muscle cells
   (*b*) gap between two neurons
   (*c*) gap between two bones
   (*d*) gap between muscle and bone

8. **The spinal cord is protected by**
   (*a*) aorta (*b*) vertebral column
   (*c*) pleura (*d*) diaphragm

9. **Which option correctly shows the order of events when a bright light is focused on our eyes?** [CBSE T.E.R.M.*]
   (*a*) Bright light → receptors in eyes → sensory neuron → spinal cord → motor neurons → eyelid closes
   (*b*) Bright light → receptors in eyes → spinal cord → sensory neuron → motor neurons → eyelid closes
   (*c*) Bright light → receptors in eyes → sensory neuron → motor neurons → spinal cord → eyelid closes
   (*d*) Bright light → receptors in eyes → spinal cord → motor neurons → sensory neuron → eyelid closes

10. **The image shows the structure of a neuron.**



After our nose senses a smell, which option shows the mechanism of the travelling of sense in our body? [CBSE T.E.R.M.*]
   (*a*) Olfactory receptors → dendritic tip of a nerve cell → axon → nerve ending → release of signal → dendritic tip of other nerve cell
   (*b*) Olfactory receptors → dendritic tip of a nerve cell → axon → cell body → release of signal → dendritic tip of other nerve cell
   (*c*) Gustatory receptors → dendritic tip of a nerve cell → cell body → axon → release of signal → dendritic tip of other nerve cell
   (*d*) Gustatory receptors → dendritic tip of a nerve cell → axon → cell body → release of signal → dendritic tip of other nerve cell

11. **Which of the following statements are true about the brain?**
   (*i*) **The main thinking part of the 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*)

Answers

1. (*c*) Nerve cell comprises of cyton, axon and nerve ending and nucleus lies within cyton.
2. (*d*) In a reflex action, the nerve impulse moves from the receptor organ to the spinal cord and then to the effector organ like muscles.
3. (*d*)
4. (*b*) In a reflex action, the effector organ responds to the stimulus and here the effector organ (hand) responds to the stimulus, flame.
5. (*a*) There are 12 pairs of cranial nerves present in man.
6. (*c*) Reflex impulse moves from the receptor organ to the spinal cord and then to the effector organ like muscles.
7. (*b*)
8. (*b*)
9. (*a*)
10. (*a*) Olfactory receptors → dendritic tip of a nerve cell → axon → nerve ending → release of signal → dendritic tip of other nerve cell.
11. (*c*)

Very Short Answer Type Questions 2 Marks

12. **Name the two main organs of our central nervous system. Which one of them plays a major role in sending command to muscles to act without involving thinking process? Name the phenomenon involved.**

Ans. The two main organs of CNS are brain and spinal cord.
Spinal cord plays a major role in sending command to muscles to act without involving thinking process. This phenomenon is called reflex action.

13. **Name the two types of neurons? How is the functioning of one different from the other?**

Ans. Two types of neurons are:
   (*i*) Sensory neurons – They pass information from the receptors to the brain.
   (*ii*) Motor neurons – They transmit information from the brain to the effector organs.

14. Which is the control centre of a reflex action? What is the route taken by the reflex action called?

Ans. Spinal cord is the control centre of a reflex action. The route taken by the reflex action is called reflex arc.

15. Distinguish between spinal nerve and cranial nerve.

Ans.

Spinal nerve	Cranial nerve
(*i*) They arise from spinal cord.	(*i*) They arise from brain.
(*ii*) There are 31 pairs of spinal nerves.	(*ii*) There are 12 pairs of cranial nerves.

16. How does the nervous system serve for coordination of all other systems in the body?

Ans. (*i*) Nervous system receives information of changes in the external environment, analyses and interprets the information to produce sensations like vision or pain.

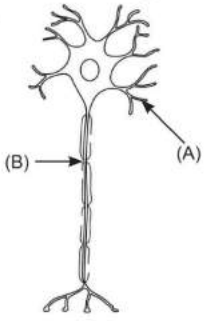
(*ii*) It also receives information of changes in the interior of the body and coordinates the activities of the visceral organs in the light of those changes and maintains a constant internal environment.

17. What are cranial nerves? How many cranial nerves does a human being have?

Ans. Cranial nerves are those nerves which arise from different parts of the brain.

A human being has 12 pairs of cranial nerves.

18.



(*a*) Name the parts labelled A and B in the neuron drawn above.

(*b*) Which part acquires the information in the neuron?

(*c*) Through which part does the information travel?

(*d*) In what form does this information travel? [KVS]

Ans. (*a*) A-Dendrite, B-Axon

(*b*) Dendrite.

(*c*) Dendrite to cell body or cyton to axon.

(*d*) Electrical impulse in the region of synapse.

19. Name the part of brain which is responsible for the following actions:

(*i*) Maintaining posture and balance

(*ii*) Beating of heart

(*iii*) Thinking

(*iv*) Blood pressure [CBSE 2023]

Ans. (*i*) Cerebellum

(*ii*) Medulla

(*iii*) Cerebrum

(*iv*) Medulla

Short Answer Type Questions 3 Marks

20. (*a*) What are receptors?

(*b*) Define stimulus?

Ans. (*a*) It is a cell or group of cells specialised to detect a particular stimulus and to initiate the transmission of impulses *via* the sensory nerves.

(*b*) It is the change in the external or internal environment of an organism that provokes a physiological and behavioural response in the organism.

21. (*a*) (*i*) Name one gustatory receptor and one olfactory receptor present in human beings.

(*ii*) Write a and b in the given flow chart of neuron through which information travels as an electrical impulse. [CBSE 2018]

Dendrite → a → b → End point of Neuron

(*b*) What do you understand by the term 'target organ'? Give any one example.

Ans. (*a*) (*i*) Gustatory receptor—Tongue
Olfactory receptor—Nose

(*ii*) a–Cell body/Cyton
b–Axon

So, electric impulse flow chart will be as follows:

Dendrite → Cell body/Cyton → Axon → End point of neuron

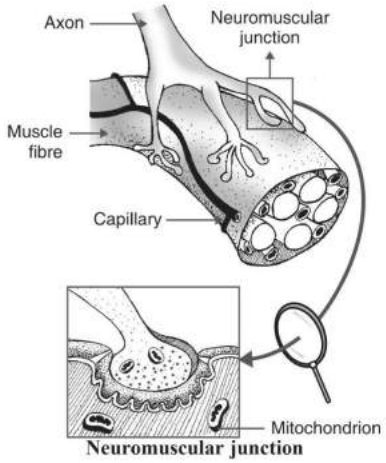
(*b*) Specific tissue or organ on which hormones act are called target organs, e.g. digestive system.

22. (*a*) Which is the control centre of a reflex action? What is the route taken by the reflex action called?

(*b*) What is Neuromuscular Junction?

Ans. (*a*) Spinal cord is the control centre of a reflex action. The route taken by the reflex action is called reflex arc.

(*b*) It is the point where a muscle fibre comes in contact with a motor neuron carrying nerve impulses from the central nervous system. The impulses travel from the neuron to the muscle fibre by means of a neurotransmitter in the same way as the transmission of impulses across a synapse between two neurons.



Neuromuscular junction

23. (*a*) Where are pons present in the brain? Which activity do they control?

(*b*) Different parts of brain are associated with specific functions. Name the part of human brain which perform the following functions:

(*i*) Picking up a pencil

(*ii*) Riding a bicyle

Ans. (*a*) Pons are situated below the cerebellum and above the medulla oblongata in the hind-brain. They are responsible for regulating the respiratory activity.

(*b*) (*i*) Hind-brain (cerebellum)

(*ii*) Hind-brain (cerebellum)

24. (*a*) What are cranial nerves? How many cranial nerves does a human being have?

(*b*) Write the difference between cerebellum and cerebrum.

Ans. (*a*) Cranial nerves arise from the brain and spread throughout the head.

There are twelve pairs of cranial nerves.

(*b*)

Cerebrum	Cerebellum
(*i*) It is the largest highly developed and prominent part of the brain.	(*i*) It is the second largest part of the brain and lies at the posterior part of the brain.
(*ii*) It is the controlling centre for senses. It is responsible for memory, intelligence, hearing, etc.	(*ii*) It controls the skeletal, muscle activities and maintains the equilibrium of the body.

25. (*a*) Which is the largest part of the brain? What are its functions?

(*b*) Distinguish between spinal nerve and cranial nerve.

Ans. (*a*) Cerebrum is the largest part of the brain. Its various regions carry out different activities, i.e. occipital lobe for vision, temporal for auditory reception, parietal for touch, smell, temperature and consciousness and frontal lobe for muscular activities.

(*b*)

Spinal nerve	Cranial nerve
(*i*) They arise from spinal cord.	(*i*) They arise from brain.
(*ii*) There are 31 pairs of spinal nerves.	(*ii*) There are 12 pairs of cranial nerves.

26. (*a*) What are sensory and motor neurons? Write their function. **[DoE]**

(*b*) Different parts of brain are associated with specific functions. Name the part of human brain which perform the following functions: **[CBSE 2018C]**

(*i*) Sensation of feeling full

(*ii*) Vomitting

Ans. (*a*) Two types of neurons are:

(*i*) Sensory neurons – They transmit information from the receptors to the central nervous system.

(*ii*) Motor neurons – They transmit information from the brain to the effector organs.

(*b*) (*i*) Fore-brain (a centre for hunger)

(*ii*) Hind-brain (medulla)

27. State the functions of any three of the structural and functional unit of nervous system.

Ans. The structural and functional unit of nervous system is neuron and their functions are as follows:

(*i*) **Cell body:** Stimulus received from dendrite is changed into impulse in the cyton.

(*ii*) **Dendrites:** They receive sensation or stimulus, which may be physical, chemical, mechanical or electrical. They pass the stimulus to cyton.

(*iii*) **Axon:** It conducts impulse away from the cell body.

28. What is a reflex action? Describe the steps involved in a reflex action. **[KVS]**

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

Mechanism of Reflex Action. It involves the following steps :

(*i*) Receptor organ like skin perceives the stimulus and activates a sensory nerve impulse.

(*ii*) Sensory organ carries message in the form of sensory impulse to the spinal cord.

(*iii*) The spinal cord acts as modulator. The neurons of spinal cord transmit the sensory nerve impulse to motor neuron.

(*iv*) Motor nerve conducts these impulses to the effectors like leg muscles which responds by pulling back the organ away from the harmful stimulus.

29. What is synapse? In a neuron cell how is an electrical impulse created and what is the role of synapse in this context? [CBSE 2015]

Ans. Synapse is the junction between two adjacent neurons or nerve cells, i.e. between axon ending of one and the dendrite of the next.

Transmission of Nerve Impulse. The information acquired at the end of the dendritic tip of a neuron sets off a chemical reaction which creates an electrical impulse. This impulse travels from the dendrite to the cyton along the axon to its end. At the end of the axon, the electrical impulse sets off the release of some chemicals, which cross the synapse and start a similar electrical impulse in a dendrite of the next neuron. In this way nerve impulses travel in the body. Synapse helps in transmitting impulses from one neuron to another.

30. (*a*) How is brain protected from injury and shock?
(*b*) Name two main parts of hind-brain and state the functions of each.

Ans. (*a*) The brain sits inside a bony box. Inside the box, the brain is contained in a fluid filled balloon which provides further shock absorption.

(*b*) Two main parts of hind-brain are–Medulla and Cerebellum. Their functions are:

Medulla: It controls involuntary actions such as blood pressure, salivation and vomiting are controlled by medulla.

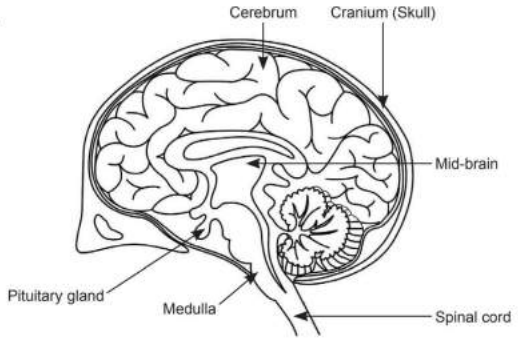
Cerebellum: It is responsible for precision of voluntary actions and maintaining the posture and balance of the body.

31. Write any three functions of the nervous system.

Ans. (*i*) It regulates involuntary actions.
(*ii*) It controls and coordinates voluntary muscular activities.
(*iii*) It keeps us informed about the outside world through the sense organs.
(*iv*) It enables us to think, reason and remember.
(*v*) It controls all the reflex actions in our body, thus protecting it from harm. (*any three*)

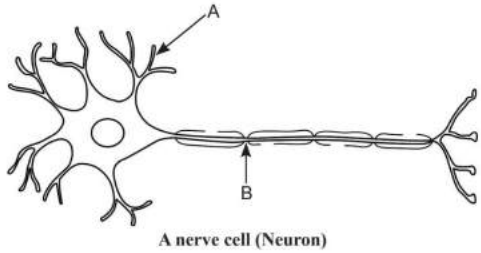
32. Draw neat diagram of human brain and label on it the following parts:
(*a*) Mid-brain
(*b*) Pituitary gland
(*c*) Medulla
(*d*) Cerebrum
(*e*) Cranium
(*f*) Spinal cord

Ans.



Long Answer Type Questions 5 Marks

33. (*a*)



A nerve cell (Neuron)

(*i*) Name the parts labelled A and B in the neuron drawn above.
(*ii*) Which part acquires the information in the neuron?
(*iii*) Through which part does the information travel?
(*iv*) In what form does this information travel?
(*v*) Where is the impulse converted into a chemical signal for onward transmission?

(*b*) What is reflex? How does it work in human?

Ans. (*a*) (*i*) A – Dendrite B – Axon
(*ii*) The information in the neuron is acquired at the end of the dendrite tip.
(*iii*) The information travels from the dendrite to the cell body and then along the axon to its end.
(*iv*) The information travels in the form of an impulse.
(*v*) The impulse is converted into a chemical signal at the end of the axon.

(*b*) Sudden action in response to something. Nerves that detect an emergency situation is connected to nerves that move the muscles immediately

34. Suggest six reflex actions of the body. Explain how the reflex arc is the same in all of them.

Ans. Six reflex actions of the body are:
(*i*) When we see a speeding car moving towards us, we move aside.
(*ii*) We withdraw our hands on being pricked by a pin.

(*iii*) We withdraw our hands on touching very hot substance.

(*iv*) We close our eyes on seeing direct sun or extremely bright source of light.

(*v*) We close our eyes on hearing a loud noise.

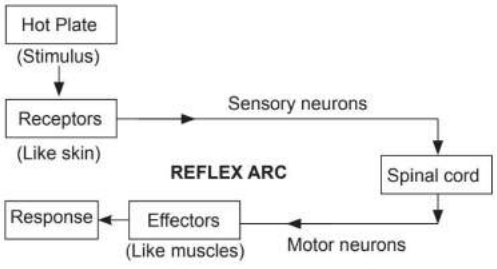
(*vi*) We shiver on feeling cold.

Reflex arc in all the above cases is same because in all the cases, the stimulus is received by sense organs. Then this information is carried to spinal cord through sensory nerves. Thus, information from spinal cord is sent to the effectors such as muscles *via* motor neurons.

Receptors $\xrightarrow[\text{neurons}]{\text{Sensory}}$ Spinal cord $\xrightarrow[\text{neurons}]{\text{Motor}}$ Effectors

35. What is a reflex arc? Draw a neat labelled diagram of the components in a reflex arc. Why do impulses flow only in one direction in a reflex arc? [HOTS]

Ans. Reflex arc is the pathway taken by the nerve impulses and responses in a reflex action, i.e. from the receptor organs like skin to the spinal cord and from the spinal cord to the effector organs like muscles.

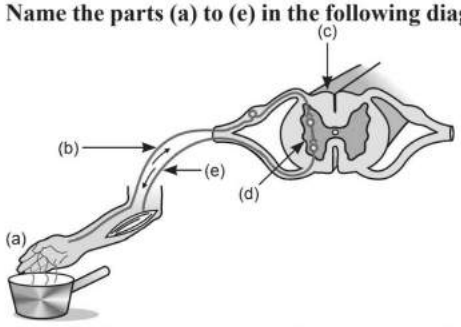


Impulses flow only in one direction in a reflex arc, because each synapse in the reflex arc allows impulses to cross in a single direction.

36. What is meant by reflex action? With the help of a labelled diagram trace the sequence of events which occur when we touch a hot object. [CBSE 2015]

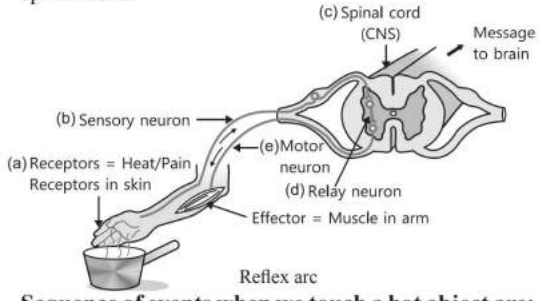
Or

Name the parts (a) to (e) in the following diagram.



What is the term given to the sequence of events occurring in the diagram? [CBSE 2020]

Ans. Reflex action is defined as an unconscious, automatic and involuntary response of effector, i.e. muscle and gland to a stimulus which is monitored through the spinal cord.



Sequence of events when we touch a hot object are:

- Receptor organ skin receives the stimulus and activates a sensory nerve impulse.
- Sensory neuron carries the message in the form of sensory impulse to the spinal cord.
- The spinal cord acts as a modulator. The neurons of spinal cord transmit the sensory nerve impulses to motor neuron.
- Motor nerve conducts these impulses to the effector organ hand which responds by pulling back the hand away from the hot object.

PRACTICE QUESTIONS

1. Which is not the part of hind-brain?
(*a*) Medulla oblongata
(*b*) Cerebrum
(*c*) Cerebellum
(*d*) Pons

2. Which area of the brain is responsible for control of the body temperature?
(*a*) Pituitary (*b*) Thalamus
(*c*) Hypothalamus (*d*) Hind-brain

3. Junction of two neurons is called: [KVS]
(*a*) Synapse (*b*) Synapsis
(*c*) Joint (*d*) Junction

4. What is voluntary action?

5. What is involuntary action?

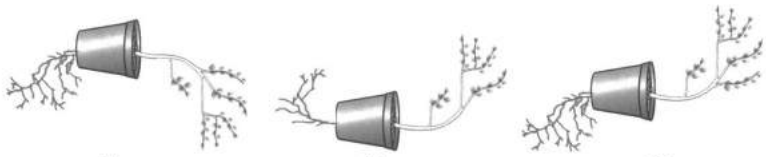
6. Draw the diagram of human brain and label the parts. Write the function of cerebellum and pons. [KVS]

TOPIC COVERED

Coordination in Plants

Multiple Choice Questions 1 Mark

1. **Observe the three figures given below. Which of the following depicts tropic movements appropriately?** [CBSE Sample Paper 2023]



(*a*) B and C (*b*) A and C (*c*) B only (*d*) C only

2. **Which statement is incorrect about auxins?**
   (*a*) They promote the growth of root
   (*b*) They promote the growth of shoot
   (*c*) They influence the formation of flower and ripening of fruit
   (*d*) They inhibit the growth of root

3. **The hormone that is used to keep flowers fresh is**
   (*a*) cytokinin (*b*) gibberellins
   (*c*) auxin (*d*) abscisic acid

4. **The main effect of cytokinin in plants is to**
   (*a*) improve the quality of fruits
   (*b*) prevent the growth of lateral buds
   (*c*) regulate opening and closing of stomata
   (*d*) stimulate cell division

5. **Abscisic acid controls**
   (*a*) cell elongation and cell wall formation
   (*b*) shoot elongation
   (*c*) cell division
   (*d*) leaf fall and dormancy

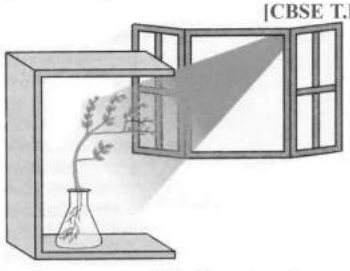
6. **In plants the role of cytokinin is:** [CBSE 2023]
   (*a*) Promote cell division.
   (*b*) Wilting of leaves.
   (*c*) Promote the opening of stomatal pore.
   (*d*) Help in the growth of stem.

7. **Auxin is a plant hormone that promotes cell elongation and is produced by the apical meristem. It inhibits the growth of lateral buds which are present at nodes (where leaves attach to the stem). As long as sufficient auxin is produced by the apical meristem, the lateral buds remain dormant.**
   A gardener wants the plants in the hedge that he is growing to become bushier with more branches. Which of the following should he do? [CFPQ, CBSE]
   (*a*) Spray water on the tips of the stems to increase growth
   (*b*) Dig around the plant roots and apply more manure
   (*c*) Trim the hedge by cutting off the tips of the stems
   (*d*) Remove all the weeds that grow around the hedge

8. **The leaves of *Mimosa* are sensitive to**
   (*a*) light (*b*) smell (*c*) touch (*d*) heat

9. **During pollination, plants ensure that the pollen grain from a species germinates on the stigma of the same species.**
   Which of the following ensures this? [CFPQ, CBSE]
   (*a*) Hydrotropism (*b*) Chemotropism
   (*c*) Phototropism (*d*) Geotropism

10. **Akash potted some germinated seeds in a pot. He put the pot in a cardboard box that was open from one side. He keeps the box in a way that the open side of box faces sunlight near his window. After 2-3 days he observes the shoot bends towards light as shown in image.**
    Which type of tropism he observes? [CBSE T.E.R.M.*]



(*a*) Geotropism (*b*) Phototropism
(*c*) Chemotropism (*d*) Hydrotropism

Answers

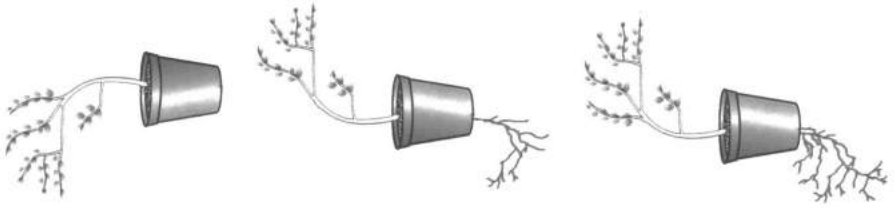
1. (*d*) C only
2. (*d*) Auxins are group of plant hormones synthesised at the shoot tip of the plant body. They promote the growth of root.
3. (*a*) Cytokinins helps in delaying senescence in plant parts that are cut. They are used to keep cut flowers fresh.
4. (*d*)
5. (*d*)
6. (*a*) Cytokinins are present in greater concentration in plants in area of rapid cell division, such as in fruit and seeds.
7. (*c*)
8. (*c*) The leaves of *Mimosa* begin to fold up and droop when touched.
9. (*b*) Chemotropism is the movement of a part of a plant in response to a chemical stimuli, e.g. growth of pollen tube towards a chemical produced by ovule.
10. (*b*) Phototropism is the movement of a part of a plant towards light.

VSA Very Short Answer Type Questions 2 Marks

11. List the sequence of events that occur when a plant is exposed to unidirectional light, leading to bending of a growing shoot. Also name the hormone and the type of movement.

Ans.
- Auxin diffuses towards shady side.
- Causes elongation on one side (shady side) resulting in bending of growing shoot.
- The hormone responsible for bending is auxin and the movement is phototropic movement.

12. The given experimental set-up establishes the response of different plant parts towards gravity.



(*a*) Give the scientific term used for such response/movement.
(*b*) How is shoot response different from root response/movement?

Ans. (*a*) Scientific term used for such movement is Geotropism.
(*b*) Root shows positive geotropic movement while shoot shows negative geotropic movement.

13. How does control and coordination take place in plants?

Ans. In plants, control and coordination is brought about by means of chemical substances called phytohormones. In addition, environmental factors like water, temperature and light, controls growth and development.

14. Where are auxins synthesized in a plant? Which organ of the plant shows: [CBSE 2023]
(*a*) Positive phototropism
(*b*) Negative geotropism
(*c*) Positive hydrotropism

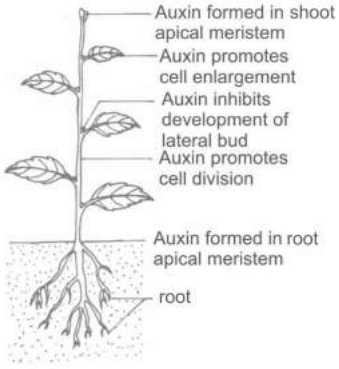
Ans. Auxins are synthesised in the stem of a plant.
(*a*) Stem as it moves towards light.
(*b*) Shoots as it moves upwards.
(*c*) Roots as it moves towards water in soil.

15. Hema bought some unripe tomatoes and left half of them in a brown paper bag and the other half in an open tray. After two days she noticed that the tomatoes in the paper bag had ripened, but the ones in the open tray had not.
(*a*) What hormone facilitated the ripening of tomatoes?
(*b*) Why did the tomatoes in the paper bag ripen faster? [CFPQ, CBSE]

Ans. (*a*) Ethylene hormone facilitates the ripening of fruits.
(*b*) Ethylene is a gaseous hormone and the paper bag prevented it from diffusing into the air. Hence the tomatoes in the paper bag ripened faster.

16. Give a schematic diagram to explain the effect of auxins in different parts of the plant.

Ans.



Effect of auxins in different parts of the plant

Short Answer Type Questions 3 Marks

17. Write one example each of the following tropic movements :
(*a*) Positive phototropism
(*b*) Negative phototropism
(*c*) Positive geotropism
(*d*) Negative geotropism
(*e*) Hydrotropism
(*f*) Chemotropism **[CBSE 2014]**

Ans. (*a*) Positive Phototropism: Movement of stem of a plant towards light.
(*b*) Negative phototropism: Movement of roots away from light.
(*c*) Positive geotropism: Movement of roots towards gravity.
(*d*) Negative geotropism: Upward movement of shoots.
(*e*) Hydrotropism: Growth of roots of a plant towards water in soil.
(*f*) Chemotropism: Growth of pollen tubes towards ovule.

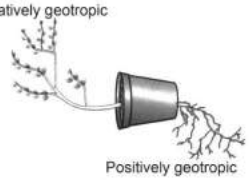
18. Write the main difference between auxins and cytokinins.

Ans.

Auxins	Cytokinins
(*i*) They are the growth hormones.	(*i*) They are responsible for cell division.
(*ii*) They are synthesised in the shoot tip.	(*ii*) They are synthesised in the endosperms of seeds and roots.
(*iii*) They are responsible for growth, root formation and production of parthenocarpic fruits.	(*iii*) They are responsible for cell division, ageing, initiation of roots, shoots and apical dominance.

19. What is geotropism? Draw a labelled diagram of a potted plant showing positive geotropism and negative geotropism. **[CBSE 2018C]**

Ans. Geotropism refers to the growth movements of plants in response to the gravity or pull of earth.



20. State the functions of plant hormones. Name four different types of plant hormones.

Ans. The plant hormones regulate many functions in plants, which are as follows:
(*i*) Germination of seeds or breaking the dormancy of seeds,
(*ii*) Growth of root, stem and leaves,
(*iii*) Flowering of plants,
(*iv*) Ripening of fruits,
(*v*) Movement of stomata in leaves, and
(*vi*) Phototropism, geotropism, chemotropism and nastic movements.

Four different types of plant hormones are auxins, gibberellins, cytokinins and abscisic acid.

Long Answer Type Questions 5 Marks

21. (*a*) Classify the following movements as tropic or nastic:
(*i*) Opening of flower.
(*ii*) Roots moving downwards.
(*iii*) Shoots moving towards light.
(*iv*) Twirling of a tendril.
(*b*) (*i*) Which plant hormone is present in greater concentration in the areas of rapid cell division?
(*ii*) Give one example of a plant growth promoter and a plant growth inhibitor.
(*c*) Why is abscisic acid is also called as stress hormone? **[DoE]**

Ans. (*a*) (*i*) Nastic (*ii*) Tropic
(*iii*) Tropic (*iv*) Nastic
(*b*) (*i*) Cytokinin is present in greater concentration in the areas of rapid cell division.
(*ii*) An example of a plant growth promoter is gibberellins and example of a plant growth inhibitor is abscisic acid.
(*c*) (*i*) Abscisic acid is called as stress hormone because it signals the closure of stomata to prevent water loss during severe drought, intense sunlight and heat and other adverse environmental conditions.
(*ii*) It acts as a growth inhibitor and inhibitor of plant metabolism.

22. Define tropism. Explain four kinds of tropisms with one example each.

Ans. The movement of plant in the direction of stimulus is known as tropism. Plants respond to light, touch, gravitational forces and chemicals.
The four kinds of tropism are as follows:
(*a*) Phototropism: It is the movement of a plant in response to light.
For example: Plants need sunlight, so the stem (or shoots) respond to sunlight by growing towards it.
(*b*) Geotropism: It is the movement of a plant in response to gravity.

For example: The movements of plant roots towards the earth and that of stem away from the earth.

(*c*) Hydrotropism: It is the movement of a plant in response to water.
For example: The roots of plants always go towards water, even if it means going against the pull of gravity.

(*d*) Chemotropism: It is the movement of a plant in response to a chemical stimulus.
For example: The growth of a pollen tube towards the ovule induced by a sugary substance.

PRACTICE QUESTIONS

1. Plants bend towards a light source as a result of
   (*a*) unequal auxin distribution in their stems
   (*b*) increased amount of food synthesised by leaves
   (*c*) necessity of light for transpiration
   (*d*) inability to synthesise chemical regulators
2. Growth of pollen tube towards ovule is called:
   (*a*) phototropism (*b*) chemotropism
   (*c*) hydrotropism (*d*) geotropism
3. When we touch the leaves of "touch-me-not" plant, they began to fold up and droop. How does the plant communicate the information of touch? [CBSE T.E.R.M.*]
   (*a*) The plant uses electrical signals to transfer information from cell to cell.
   (*b*) The plant uses electrical-chemical signals to transfer information from cell to cell.
   (*c*) The plant uses electrical-chemical signals to transfer information from tissue to specialised cells.
   (*d*) The plant uses electrical signals to transfer information from cell to specialised tissues.
4. The growth of tendrils in pea plants is due to [KVS]
   (*a*) effect of light
   (*b*) effect of gravity
   (*c*) rapid cell division in tendrillar cells in contact with the support
   (*d*) rapid cell divisions in tendrillar cells that are away from the support.
5. Why do stem and root show unilateral growth towards light and gravity of earth respectively?
6. What are auxins and where are they synthesised in the plant body?
7. (*a*) What is tropism?
   (*b*) How do auxins promote the growth of a tendril around a support? [CBSE 2020]
8. Name the plant growth hormone which is synthesized at the shoot tip. Explain briefly why a plant bends towards light during its growth. [KVS]

TOPIC COVERED

Hormones in Animals

Multiple Choice Questions 1 Mark

1. **Which one of the endocrine gland is known as 'master gland'?** [KVS]
   (*a*) Pancreas (*b*) Adrenal
   (*c*) Pituitary (*d*) Hypothalamus
2. **Which of the following acts as both endocrine and exocrine glands?**
   (*a*) Adrenal (*b*) Pituitary
   (*c*) Ovaries (*d*) Pancreas
3. **Which hormone regulates the ionic balance in the body?**
   (*a*) Glucagon
   (*b*) Thyroxine
   (*c*) Testosterone
   (*d*) Vasopressin
4. **Which of the following is not a ductless gland?**
   (*a*) Adrenal (*b*) Liver
   (*c*) Thyroid (*d*) Pituitary
5. **Ageing in human beings is caused by disappearance of which of the following glands?**
   (*a*) Adrenal (*b*) Pituitary
   (*c*) Thyroid (*d*) Thymus
6. **Hormones produced in one part of the human body reach the target location *via***
   (*a*) blood (*b*) muscles
   (*c*) bones (*d*) cartilage

*Teacher Energised Resource Manuals

Answers

1. (*c*) Pituitary gland is located at the base of the brain. It is known as 'master gland' as it controls the functions of the other endocrine glands.
2. (*d*)
3. (*d*)
4. (*b*) Liver secretes bile juice through a duct to the small intestine to facilitate the action of pancreatic enzymes.
5. (*d*)
6. (*a*) Hormones are produced by endocrine glands which are ductless and travel *via* blood throughout the body.

Very Short Answer Type Questions 2 Marks

7. Write names of four hormones secreted from pituitary gland and also write their functions.

Ans. The four hormones secreted from pituitary gland along with their functions are as follows :

Hormone	Function
(*i*) Growth hormone	Development of bones and muscles.
(*ii*) Prolactin	Regulation of functioning of mammary gland.
(*iii*) Oxytocin	Regulates ejection of milk and birth hormone.
(*iv*) Vasopressin	Regulation of water and electrolyte balance.

8. How do you support the statement that 'pancreas' are the overall controller of the blood glucose level?

Ans. Pancreas releases insulin which lowers the blood glucose. It also releases glucagon which increases blood glucose. Thus, pancreas is the overall controller of blood glucose level.

9. Name the hormone secreted by human testes. State its functions.

Ans. Testes secrete male sex hormone called testosterone. The function of testosterone is to regulate male accessory sex organs and secondary sexual characters like moustache, beard and voice.

10. (*a*) Name the hormones that are released in human males and females when they reach puberty.

(*b*) Name a gland associated with brain. Which problem is caused due to the deficiency of the hormone released by this gland? [CBSE 2014]

Ans. (*a*) Testes in males produces hormone testosterone. Ovaries in females produces hormone oestrogen.

(*b*) Pituitary gland is associated with brain. It releases growth hormone which stimulates growth in all organs. A person having deficiency of growth hormone suffers from dwarfism whereas a person having too much growth hormone becomes very tall.

Short Answer Type Questions 3 Marks

11. (*a*) How do you support the statement that 'pancreas' are the overall controller of the blood glucose level? [HOTS]

(*b*) What are 'releasing hormones'? Where are they released from?

Ans. (*a*) Pancreas releases insulin which lowers the blood glucose. Moreover, it also releases glucagon which increases blood glucose. Therefore, pancreas is the overall controller of blood glucose level.

(*b*) 'Releasing hormones' are chemical substances which regulate the secretion of hormones from pituitary gland.
They are released from hypothalamus gland.

12. (*a*) Justify that the pancreas and the gonads perform dual functions.

(*b*) Explain with an example the role played by hypothalamus in human body.

Ans. (*a*) Pancreas secretes digestive enzymes as well as insulin and glucagon hormones. Similarly, gonads produce gametes as well as male and female sex hormones. Thus, pancreas and gonads perform 'dual functions'.

(*b*) Hypothalamus plays important role in producing releasing hormones and inhibiting hormones. For example, if the level of growth hormone decreases in body, the hypothalamus releases neurohormones which stimulates the pituitary gland to release growth hormone.

13. Distinguish between exocrine and endocrine glands.

Ans.

Exocrine glands	Endocrine glands
(*i*) They may or may not have ducts.	(*i*) They are ductless glands.
(*ii*) They secrete enzymes.	(*ii*) They secrete hormones.
(*iii*) They either function in situ and pour their secretions directly near its target or through a duct.	(*iii*) They pour their secretions directly into blood.

14. Name the hormone which regulates carbohydrate, protein and fat metabolism in our body. Which gland secretes this hormone? Why is it important for us to have iodised salt in our diet? [CBSE 2016]

Ans. Thyroxine regulates carbohydrates, protein and fat metaboslism in our body.

Thyroxine is secreted from thyroid gland. Deficiency of iodine in our food causes (goitre) where the thyroid gland enlarges as it needs to absorb more amount of iodine. Iodine is required to make thyroxine. Therefore, iodine is added to salt to supplement iodine requirement.

15. What is feedback mechanism of hormonic regulation. Take the example of insulin to explain this phenomenon. [Delhi 2019]

Ans. Hormones are secreted in extremely less quantity. Excess or deficiency of such hormones can have harmful effects on our body. A feedback mechanism controls the timing and secretion of hormones released by various glands.

For example: On the rise of blood glucose level, information is sent to pancreas to release insulin. When the appropriate amount of glucose level is obtained in the blood, the release of insulin is stopped.

16. A squirrel is in a scary situation. Its body has to prepare for either fighting or running away. State the immediate changes that take place in its body so that the squirrel is able to either fight or run? [CBSE 2020]

Ans. Adrenaline hormone in large amount is secreted in its body when a squirrel is in scary situation and following immediate changes takes place in its body so that squirrel is able to either fight or run:

(*i*) The heartbeat increases

(*ii*) The breathing rate increases

(*iii*) More glucose goes into blood to release energy which helps squirrel to either fight or run away.

Long Answer Type Questions 5 Marks

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

(*b*) Explain the need of chemical communication in multicellular organisms. [CBSE 2014]

Ans. (*a*) When sugar level rises, hormone insulin is released into blood. Insulin is released in our body by pancreas. When insulin is secreted in lower quantity by pancreas, the blood sugar level of the concerned person increases. On the other hand if the insulin is secreted in excess, the person suffers from low sugar in blood.

Pancreas secretes enzyme like trypsin for digesting proteins and lipase for breaking down emulsified fats.

(*b*) Chemical communication is required in multicellular organisms to deal with emergency demand such as infection, traums, dehydration, starvation, haemorrhage, extreme temperature, etc. The nervous coordination is fast but short-lived. As the nerve fibres do not connect to all cells of the body and the cellular functions need to be continuously regulated; a special kind of coordination and integration has to be provided. This function is carried out by hormones. The nervous system and the endocrine system jointly coordinate and regulate the physiological functions in the body.

18. What are hormones? Give the name of associated gland and functions of different animal hormones. [DoE]

Ans. Hormones are the chemical substances which control and coordinate the activities of living organisms and also their growth. Name of hormones with their releasing gland and function is tabulated below:

S. No.	Name of hormone	Releasing gland	Function of the hormone
1.	Growth hormone	Pituitary gland	It stimulates growth in all organs. The height of a person depends on it. Normal secretion leads to normal height, excess secretion produces in very tall person and deficiency of its causes dwarfness. Main tissues related to its work are bones, cartilage, muscles, fat, liver and heart.
2.	Thyroxine	Thyroid gland	It controls the rate of metabolism of carbohydrates, fats and proteins in the body.
3.	Insulin	Pancreas	It acts to lower or raise blood sugar level. It also acts to control glucagon and insulin release.
4.	Testosterone	Testes	Regulates sex drive, bone mass, fat distribution, muscle mass and produces sperms. It also promotes development of secondary sexual characteristics of male.

5.	Progesterone and estrogen	Ovaries	Estrogen helps female in development of breast and reproductive organs in female. Estrogen also helps in maintenance of pregnancy. Progesterone prepares the female body for pregnancy by causing thickening of uterine lining.
6.	Releasing hormone	Hypothalamus	It regulates the secretion of hormones from pituitary gland, i.e. hypothalamus controls the pituitary hormones.
7.	Adrenaline	Adrenal gland	It regulates the heart rate, breathing rate, blood pressure and carbohydrate metabolism.

(*any five*)

PRACTICE QUESTIONS

1. Name the hormone that lowers the blood sugar level.
   (*a*) Adrenaline (*b*) Estrogen
   (*c*) Glucagon (*d*) Insulin
2. Which hormone is responsible for the development of female characteristics?
   (*a*) Adrenaline (*b*) Estrogen
   (*c*) Thyroxine (*d*) Testosterone
3. Which hormone regulates carbohydrate, protein and fat metabolism?
   (*a*) Insulin (*b*) Glucagon
   (*c*) Thyroxine (*d*) Adrenaline
4. Name the source gland and one major effect of each of the following hormones:
   (*a*) Parathormone (*b*) Progesterone
5. Give one example to show how the endocrine system coordinates our body activities.
6. A compound of iodine is compulsorily added to common salt in small quantity.
   (*a*) Why is it important for us to have iodized salt in our diet?
   (*b*) Name the disease caused by its deficiency.
   (*c*) Write the symptoms of the disease. **[KVS]**

INTEGRATED (MIXED) QUESTIONS

1. (*a*) As first line of defense, stress hormones are released in humans. As an equivalent, which hormone is most likely to be released as first line of defense in plants?
   (*b*) There have been reports of plant hormones being found in animal bodies even when they are not synthesised by the animal. What can be the most common pathway of entry of such hormones in animals? **[CFPQ, CBSE] (2 Marks)**
2. (*a*) Name ONE plant hormone that controls directional growth.
   (*b*) Plant hormones are also referred to as growth regulators and can be controlled by a number of stimuli. Mention ONE point of difference between the functioning of animal growth hormones and plant growth regulators with respect to such control. **[CFPQ, CBSE] (2 Marks)**
3. Suggest a proof that even unicellular organisms like *Amoeba* respond to stimuli. Justify giving two examples that even plants respond to stimuli. **(3 Marks)**
4. (*a*) Explain any three directional movements in plants.
   (*b*) How brain and spinal cord are protected in human?
   (*c*) Name the master gland present in the brain. **[CBSE 2013] (3 Marks)**
5. (*a*) Explain any three directional movements in plants.
   (*b*) How brain and spinal cord are protected in human?
   (*c*) Name the master gland present in the brain. **[CBSE 2013] (3 Marks)**
6. Why is chemical communication better than electrical impulses as a means of communication between cells in a multicellular organism? **[CBSE 2020] (3 Marks)**
7. (*a*) How does control and coordination take place in plants? **(5 Marks)**
   (*b*) Distinguish between cerebrum and spinal cord.
   (*c*) Give technical terms for following events:
      (*i*) The movement of plant in the direction of light.
      (*ii*) The movement of plant parts in response to water.
      (*iii*) The movement of plant parts towards chemical substance.
      (*iv*) The downward movement of roots in response to gravitational force.

ASSERTION AND REASON QUESTIONS

In the following Questions, the Assertion (A) and Reason (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

(*a*) Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion.
(*b*) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion.
(*c*) Assertion is true but the Reason is false.
(*d*) The statement of the Assertion is false but the Reason is true.

1. **Assertion:** Reflex arc works faster than thinking process of brain.
   Reason: Reflex arc works in case of those animals who do not have thinking process.
2. **Assertion:** Impulse travels from dendrite to cell body and then along the axon to its end.
   Reason: Information acquired at the end of the dendrite tip of a nerve cell sets of an electric impulse.
3. **Assertion:** Brain is a delicate organ which is protected from injury
   Reason: Only the bony box protects the brain from any shock.
4. **Assertion:** Plants do have a nervous system for control and coordination
   Reason: Plants use electro chemical means to convey information from cell to cell.
5. **Assertion:** On attaining puberty, breast size increases and reproductive organs develop in females.
   Reason: Ovaries release hormone progesterone in female.
6. **Assertion:** Insulin regulates blood sugar level.
   Reason: Insufficient secretion of insulin will cause diabetes. **[KVS]**
7. **Assertion:** A nerve impulse is an electrochemical event.
   Reason: In a nerve impulse there are changes in the resting potential which spread down the nerve fiber. **[KVS]**

CASE-BASED QUESTIONS

The following questions are case-based with 2-3 short sub-parts.

1. Spinal cord reflexes are simple behaviors produced by central nervous system (CNS) pathways that lie entirely within the spinal cord. The sensory afferent fibers that evoke these reflexes enter the spinal cord and activate spinal motor neurons directly or through a chain of one or more spinal interneurons. Although these pathways are entirely spinal, they are affected by descending pathways from the brain, either directly or through other spinal interneurons. Through these descending pathways, the brain exerts both short-term and long-term influence over spinal cord reflex function. In the short-term, the brain rapidly adjusts spinal reflexes to suit the needs of different tasks (e.g., standing vs. walking vs. running). In the long-term, it gradually shapes spinal reflexes during development, during skill acquisition later in life, and in response to CNS trauma and disease. The long-term changes that the brain induces in spinal cord reflexes involve activity-dependent plasticity in the spinal cord itself.
   (*a*) Name the part of the brain which controls posture and balance of the body.
   (*b*) What are the two components of the CNS in humans?
   (*c*) What is the function of adrenaline hormone?
   Or
   (*c*) What is the significance of reflex action?
2. All living organisms have the ability to detect changes in external as well as internal environment and to respond and react appropriately to these changes. Such an ability of organisms is called irritability. The changes in the environment are called stimuli and the organs that detect them are response. The response to a stimulus may be carried out by the individual cell, tissue, organs or organ system. The movements shown in response to any stimulus are definite, highly controlled and coordinated. Various organs work in full cooperation and provide appropriate reaction for the stimulus and this is called coordination. Coordination in animals is brought about the nervous and endocrine systems i.e. nervous and chemical control. In plants, it is brought about only by chemicals (hormones).
   When we are frightened by a dog, we run away as fast as we can. Here fear of dog is the stimulus and running away is the response.
   (*a*) What are the stimulus in (*i*) Geotropism and (*ii*) Chemotropism
   (*b*) What are the functions of hypothalamus?

(*c*) Why brain and spinal cord are considered as central nervous system?

Or

(*c*) Where is glucagon secreted? What is its function?

3. When we eat food, our eyes, hands and mouth works in perfect coordination. The eyes focus on the food, the hands pick it up and take it to the mouth where it is chewed. All these actions are completed in a particular sequence. Similarly, internal functions of our body are carried out by the nervous system in a particular sequence.

(*a*) What is a reflex arc?

(*b*) How is the spinal cord protected?

(*c*) How does an impulse travel in a nerve cell?

Or

(*c*) Do plants also have nerve cells? How does coordination take place in plant cells?

4. Pea plants need support to grow. It clings on any other support and grows. It is possible due to response of plant hormones to different stimuli. Normally, plants respond to such stimuli slowly. Plants respond to some stimuli by growing towards it or away from it.

(*a*) The 'touch-me-not' plant is an example of which tropism?

(*b*) Give one example of chemotropism.

(*c*) How does a pea plant cling to its support?

Or

(*c*) Name four different types of tropisms shown by plants.

5. Parkinson (PD) is a type of movement disorder that can affect the ability to perform common, daily activities. Although PD is associated with a wide range of symptoms, there are features of PD that most people with the condition will experience. These symptoms are typically divided into those that affect movement (motor symptoms) and those that do not (non-motor symptoms). The most common motor symptoms of PD are tremor (a form of rhythmic shaking), stiffness or rigidity of the muscles, and slowness of movement. A person with PD may also have trouble with posture, balance, coordination, and walking. Common non-motor symptoms of PD include sleep problems, constipation, anxiety, depression, and fatigue, among others. It is important to note that, although there are common symptoms of PD, they can vary greatly from person to person. Most people who develop the symptoms of PD do so sometime after the age of 50, but PD can affect younger persons as well. There are an estimated 1 million Americans living with PD and more than 10 million people worldwide.

(*a*) Name the hormone synthesised at the shoot tip of plants

(*b*) What is the significance of reflex action?

(*c*) What are endocrine glands?

Or

(*c*) Which hormone is released by hypothalamus gland? What is the function of this hormone?

6. Plants do not move but they respond to their environment. It means their cells must be able to communicate with other cells. Hormones send messages between the cells. Plant hormones or phytohormones are also known as plant growth substances as they coordinate the activities of plants by controlling one or other aspect of the growth of the plant. The growth of the plant can be divided into three stages: cell division, cell enlargement and cell differentiation which occur in particular locations in a plant. The phytohormones also promote dormancy in seeds and buds, breaking of dormancy, stomata control, wilting and falling of leaves, fruit growth, ripening of fruits and delay in ageing of plants.
The plant hormones are synthesised at places away from where they act and simply diffuse to the area of action.

(*a*) Name a plant hormone that inhibits growth.

(*b*) Which hormone is synthesied when growing plants detect light? Where it is synthesied?

(*c*) Write two functions of cytokinins.

Or

(*c*) Write two function of gibberellins.

7. Rohit saw an advertisement about iodised salt while watching TV. In the advertisement it was stated that one should take only iodised salt. He also remembered that the doctor has advised his elder sister to eat iodised salt when she had developed swollen neck. His teacher has also taught them about various animal hormones.

(*a*) Name the disease from which Rohit's sister suffered. Why has the doctor advised her to eat iodised salt?

(*b*) Which hormone is known as emergency hormone? How it helps in coping during emergency?

Or

(*b*) Name an endocrine gland that secretes a hormone called insulin. Why are some diabetes patients treated by giving insulin injections?

NCERT ZONE

NCERT INTEXT QUESTIONS

Page 105

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

Ans.

Reflex action	Walking
(*i*) It is a spontaneous, involuntary response to a stimulus.	(*i*) It is a voluntary response to a stimulus.
(*ii*) It is controlled by spinal cord.	(*ii*) It is controlled by brain.
(*iii*) This kind of response occur within the fraction of second.	(*iii*) This kind of response takes longer time.

2. What happens at the synapse between two neurons?

Ans. Synapse is a gap present between two adjacent neurons. Here, the axon terminal of one neuron is in close proximity to the dendrite of the second neuron. When the information collected by the nerve endings of the dendrite tip of the nerve cells set up a chemical reaction that creates an electrical impulse. This impulse is sent to cell body and them along the axon it reaches the nerve ending of the axon.

At the nerve ending, the electrical signals release chemicals. These chemicals cross the gap and again start a similar electrical impulse in another dendrite of another nerve cell. Thus, at the synapse, nerve impulse is transmitted from one neuron to other neuron.

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

Ans. Cerebellum which is a part of hindbrain maintains posture and equilibrium of the body.

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

Ans. In our nose, olfactory receptors are present. They detect the smell of incense stick and set off a chemical reaction. As a result, a nerve impulse is generated which is transmitted to sensory nerve. The sensory nerve relay the information in the form of nerve impulse to the brain *via* spinal cord. The olfactory lobe present in the forebrain interpret the message and we feel the smell.

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

Ans. Reflex action takes place in spinal cord. The informtion that a reflex action has provided goes on to reach the brain which stores the information and remembers it for future use.

Page 108

1. What are plant hormones?

Ans. A plant hormone is a chemical substance which is produced naturally in the plant and regulate growth and physiological processes to bring about control and coordination of various activities in plants.

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

Ans.

Movement of leaves of sensitive plant	Movement of shoot towards light
(*a*) Movement of leaves of the sensitive plant is an example of nastic movements.	(*a*) Movement of shoot towards light is an example of tropic movement.
(*b*) Its stimulus is touch.	(*b*) Its stimulus is light.
(*c*) It is not regarded as growth movement.	(*c*) It is regarded as growth movement.

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

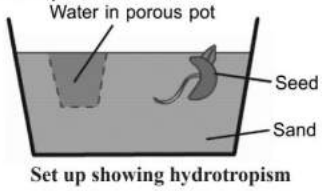
Ans. Auxin is a plant hormone that promotes growth.

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

Ans. Tendrils are sensitive to touch or contact of other objects. When a tendril touches a support, the hormone auxin from the tip of the tendril diffuses towards the side of the tendril that is not in contact with the support. As a result, the side that is not in contact with the support grows faster than the side which is in contact with the support. This leads to the bending of tendril towards the support.

5. Design an experiment to demonstrate hydrotropism.

Ans. **Following item are required to demonstrate hydrotropism:** Seeds of bean, a deep tray, sand, a porous flower pot.



Set up showing hydrotropism

Procedure:

- The tray should be big enough to accommodate the porous pot.
- Fill the tray with sand and insert some seeds in it.
- Make a pit in the sand and insert the porous pot in it.
- Fill the porous pot with water.
- Leave the set-up for about a week.

Observation: After a week when seeds are taken out, it is observed that roots grow in the direction of the porous pot. This shows hydrotropic movement in roots.

Page 111

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

Ans. In animals, endocrine gland as a result of a stimulation releases a chemical substance called hormone directly into the blood. Blood carries the hormone to the target organ. In target organ, hormone transmit the information to bring about the effect.

2. **Why is the use of iodised salt advisable?** [DoE]

Ans. Thyroid gland makes a hormone, thyroxine. Iodine is necessary for the thyroid gland to make this hormone. The thyroxine hormone regulates the metabolism of carbohydrates, fats and proteins in the body, so as to provide the best balance for growth. Deficiency of iodine in our diet results in a disorder called goitre in which thyroid gland becomes enlarged and thus, neck becomes swollen. Thus, use of iodised salt is advisable to prevent the goitre disease.

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

Ans. Adrenal glands secrete hormone adrenaline which is called emergency hormone. This hormone is rapidly secreted in response to stress or during emergency situations. This hormone speeds up heart beat, rate of respiration and raises glucose level in the blood, so that we can get a lot of energy quickly to fight or flight from the emergency situation.

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

Ans. Insulin plays an important role in sugar metabolism. Insulin lowers the blood sugar level. In some patients of diabetes, insulin secretion is reduced. Insulin injection is given to such patients to compensate for reduced insulin secretion.

NCERT EXERCISES

1. **Which of the following is a plant hormone?**
   (*a*) Insulin (*b*) Thyroxine
   (*c*) Oestrogen (*d*) Cytokinin

Ans. (*d*) Cytokinin is a plant hormone.

2. **The gap between two neurons is called a**
   (*a*) dendrite. (*b*) synapse.
   (*c*) axon. (*d*) impulse.

Ans. (*b*) Synapse is known as the gap between two neurons.

3. **The brain is responsible for**
   (*a*) thinking.
   (*b*) regulating the heart beat.
   (*c*) balancing the body.
   (*d*) all of these

Ans. (*d*) The brain is responsible for thinking, regulating the heart beat and balancing the body as well.

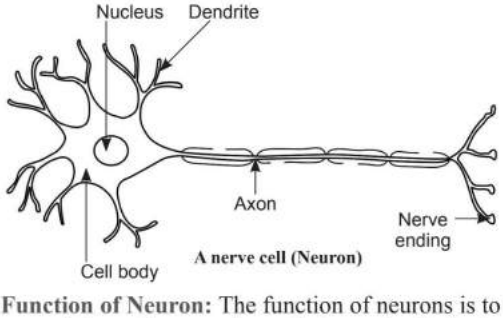
4. **What is the function of receptors in our body? Think of situations where receptors do not work properly. What problems are likely to arise?**

Ans. The function of receptors in our body is to collect informations about the changes in the environment. Receptors pass this information to central nervous system where message is interpreted and appropriate instructions are sent to effector which reveals response. These receptors are located in our sense organs. If receptors do not work properly, our body cannot convert environmental stimuli into impulses and hence, our body would not respond. For example, gustatory receptors are the receptors of taste located on the tongue. Now, if the gustatory receptors do not work properly, we will not be able to enjoy the taste of different types of food.

Olfactory receptors are the receptors of smell located in the nasal cavity. If olfactory receptors present in our nose do not work properly, we will not be able to smell things.

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

Ans.



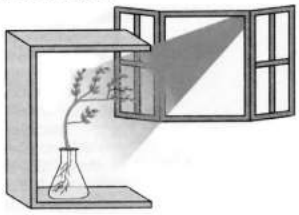
A nerve cell (Neuron)

Function of Neuron: The function of neurons is to carry information over long distances in the body of a person. The impulse of information then travel from dendrites to cell body, and then along the axon

to its end. These impulses then cross the synapse. At the end, the impulses travel from one neuron to the other up to the spinal cord or to the concerned part of the body.

6. How does phototropism occur in plants?

Ans. The directional or tropic movement of plants towards the light or away from the light is called phototropism. When a growing plant detects light, auxin synthesises at the shoot tip to help the cells to grow longer. When light comes from one side, auxin diffuses towards the shady side of the shoot. This concentration of auxin stimulates the cells to grow longer on the side of the shoot which is away from light and the plant appears to bend towards light.



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

Ans. All the signals and responses which pass from and to the brain through the spinal cord will get disturbed. Reflex actions will also get disrupted.

8. How does chemical coordination occur in plants?

Ans. In plants, the stimulated cells release chemical compounds, which are called plant hormones. Different plant hormones help to coordinate growth, development and responses to the environment. They are synthesised at places away from where they act and simply diffuse to the area of action.

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

Ans. The different organs of our body work in coordination when we perform any activity. For example, when we are taking food, our eyes help in locating the food, our nose detects the smell, our hand brings the food to our mouth, the teeth and jaw muscles chew the food and saliva starts the digestive process.

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

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

Ans. **Involuntary action** is the set of muscle movement which does not require thinking. These actions are controlled by brain. Example of involuntary actions are beating of heart, breathing, etc. Involuntary actions are concerned with the functioning of the internal body parts.

Reflex action is defined as an unconscious, automatic and involuntary response of effectors, i.e. muscles and glands, to a stimulus, which is monitored through the spinal cord. Example of reflex action is the closing of eyes immediately when bright light is focussed to eyes. Reflex actions are connected with emergency.

11. Compare and contrast nervous and hormonal mechanisms for control and coordination in animals. **[CBSE 2013]**

Ans.

Nervous mechanism	Hormonal mechanism
(*i*) It is performed by nervous system which sent an electrical impulse along axons, and as a chemical across synapse and acts through effectors.	(*i*) It is performed by chemical substances, called hormones, secreted by endocrine glands.
(*ii*) The information is transmitted instantaneously.	(*ii*) The information is transmitted slowly.
(*iii*) The effects are short-lived.	(*iii*) The effects are generally more prolonged.

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

Ans.

Movement in sensitive plant	Movement in our legs
(*a*) The movement that takes place in a sensitive plant occurs in response to touch (stimulus).	(*a*) Movement in our legs due to the voluntary actions.
(*b*) In this movement, the information is transmitted from cell to cell by electrochemical signals as plants do not have any specialised tissue for conduction of impulses.	(*b*) The signal or messages for these actions are passed to the brain and hence are consciously controlled.
(*c*) The plant cells change shape by changing amount of water for this movement to take place.	(*c*) In animal muscle cells, some proteins are found which allow the movement to occur.

SELECT NCERT EXEMPLAR PROBLEMS

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

Ans. (*a*)

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

(*a*) Auxin (*b*) Gibberellins

(*c*) Cytokinins (*d*) Abscisic acid

Ans. (*d*)

3. 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*)

4. 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*)

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

(*a*) Vomiting (*b*) Salivation

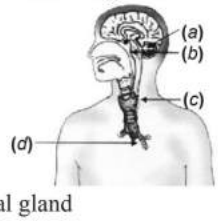
(*c*) Heart beat (*d*) Chewing

Ans. (*d*)

6. Why is it advised to use iodised salt in our diet? **[CBSE 2015, KVS]**

Ans. Iodised salt contains iodine which is necessary for the thyroid gland to synthesise thyroxine hormone. Thyroxine regulates carbohydrate, protein and fat metabolism in the body to provide growth balance. Its deficiency causes goitre.

7. Label the endocrine glands in the given figure.



Ans. (*a*) Pineal gland

(*b*) Pituitary gland

(*c*) Thyroid gland

(*d*) Thymus gland

8. 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 (*b*) Growth hormone

(*c*) Insulin (*d*) Thyroxine

9. 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 gland (*b*) Pancreas

(*c*) Adrenal glands (*d*) Testes

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

Ans. The major parts of the brain are:

(*i*) **Fore-brain** including cerebrum and olfactory lobes.

(*ii*) **Mid-brain**

(*iii*) **Hind-brain** including cerebellum, pons and medulla oblongata.

Functions of different parts are as follows:

(*i*) **Fore-brain:** There are specific regions in cerebrum for each kind of stimulus and response.

(*a*) Occipital lobe is the region for sight, i.e. visual reception.

(*b*) Temporal lobe is the region for hearing, i.e. auditory reception.

(*c*) Frontal lobe is the region for speech, facial muscular activities and higher mental activities.

(*d*) Parietal lobe is the region for taste, smell, touch and conscious association.

(*e*) Olfactory lobe receives sensation of smell.

(*ii*) **Mid-brain:** It controls reflex movements of the head, neck and trunk in response to visual and auditory stimuli.

(*iii*) **Hind-brain:**

(*a*) Cerebellum controls the coordination of body movements and posture.

(*b*) Pons take part in regulating respiration.

(*c*) Medulla oblongata is the regulating centre for swallowing, coughing, sneezing and vomiting.

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

Ans. The various plant hormones are auxin, gibberellin, cytokinin and abscisic acid.

Their physiological effects on plant growth and development are as follows :

Auxin – It is a growth hormone which helps in cell enlargement and cell differentiation. Auxin also promote fruit growth.

Gibberellin – It also helps in the growth of the stem.

Cytokinin – It promotes the cell division. It is present in high concentrations in the areas of rapid cell division such as fruits and seeds.

Abscisic acid (ABA) – They are responsible for inhibiting or checking the growth. It also causes wilting of the leaves.

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

Ans. A chemical substance is released when the electrical signal reaches the axonal end of a neuron and this chemical diffuses to the dendrite end of another neuron, which generates electrical signal. Thus, at the axonal end, the electrical signals converted into chemical signals but at the dendrite end of neurons these chemicals are not present thus the reverse action is not possible.