Control and Coordination

Previous Years' CBSE Board Questions

1. (A) How is the movement of leaves of a sensitive plant different from the downward movement of the roots ? (2024)

OR

(B) There is a hormone which regulates carbohydrate, protein and fat metabolism in our body. Name the hormone and the gland which secretes it. Why is it important for us to have iodised salt in our diet?

Answer. (A)

Movement of leaves of sensitive plant	**Downward movement of roots**
(i) Stimulus is touch.	Stimulus is gravity.
(ii) No growth is involved in the movement.	Growth is involved in the movement
(iii) Non directional	Directional

(Any two)
(Any other suitable difference)

OR

(B) • Thyroxine
• Thyroid gland
• Iodine is necessary for thyroid gland to make thyroxine hormone. Deficiency of iodine in our diet causes goitre.

2. Name and state the rule to determine the direction of a : (2024)
(i) magnetic field produced around a current carrying straight conductor.
(ii) force experienced by a current carrying straight conductor placed in a magnetic field which is perpendicular to it.

Answer. (i) • Right - Hand Thumb Rule
• If the wire carrying current is held in our right hand such that the Thumb points towards the Direction of Current, then the fingers wrap around the conductor in the direction of field lines of the magnetic field.

(ii) • Fleming's Left - Hand Rule
• Stretch the thumb, forefinger and middle finger of left hand mutually perpendicular to each other, such that first finger points in the direction of Magnetic Field, second finger in the direction of Current, then thumb in the direction of motion or force acting on the conductor.

6.1 Animals-Nervous System

MCQ

1. Sensory nerve of a reflex arc carries information from the receptor cells to the
(a) spinal cord
(b) brain
(c) muscles of the effector organ
(d) bones of the receptor organ (2023) R

2. The part in which gustatory receptors are present in our body is
(a) inner ear
(b) skin
(c) tongue
(d) inner lining of nose. (2023)

3. Assertion (A): The brain allows us to think and take actions based on that thinking.
Reason (R): The hind brain is the main thinking part of the brain which has regions which receive sensory impulses from various receptors.
(a) Both (A) and (R) are true and (R) is the correct explanation of the assertion (A).
(b) Both (A) and (R) are true, but (R) is not the correct explanation of the assertion (A).
(c) (A) is true, but (R) is false.
(d) (A) is false, but (R) is true. (2020 C)

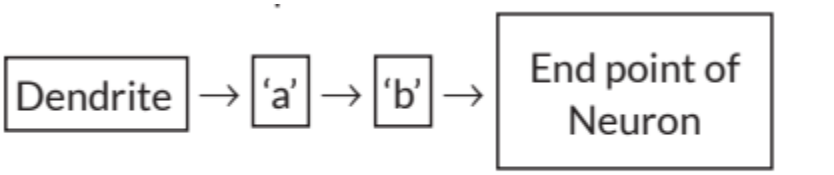
SAI (2 marks)

4. 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 (2023)

5. (a) How is the brain and spinal cord protected in human beings?
(b) State one main function of (i) Medulla and (ii) Cerebellum. (2023)

6. What is a nerve impulse? State the direction followed by a nerve impulse while travelling in the body of an organism. (2019)

7. (a) Name one gustatory receptor and one olfactory receptor in human beings.
(b) Write 'a' and 'b' in the given flow chart of neuron through which information travels as an electrical impulse.



(2018) Ev

8. Write the main functions of the following:
(a) sensory neuron
(b) cranium
(c) vertebral column
(d) motor neuron. (Board Term 1, 2017)

SA II (3 marks)

9. Draw a diagram of neuron and name and label the part
(a) where information is acquired,
(b) through which information travels as an electric impulse, and
(c) where the electric impulse must be converted into a chemical signal for onward transmission. (2019 C)

10. Why does the flow of signals in a synapse from axonal end of one neuron to dendritic end of another neuron take place but not in the reverse direction? Explain. (NCERT, AI 2019)

11. List in tabular form three distinguishing features between cerebrum and cerebellum. (2019)

12. "Reflex arcs continue to be more efficient for quick responses". Justify this statement giving reason. (Board Term I, 2017)

13. (a) Define reflex arc.
(b) Trace the sequence of events which occur in our body when a bright light is focussed on your eyes. (Board Term I, 2016)

14. (a) Draw a neat diagram of a neuron and label (i) dendrite and (ii) axon.
(b) Which part of the human brain is:
(i) the main thinking part of the brain
(ii) responsible for maintaining the posture and balance of the body? (NCERT, Board Term I, 2015)

15. Mention three major regions of brain. Write one function of each. (Board Term 1, 2014)

LA (5 marks)

16. What constitutes the central and peripheral nervous systems? How are the components of central nervous system protected? Which signals will get disrupted in case of a spinal cord injury? (2020 C)

6.2 Coordination in Plants

MCQ

17. In plants the role of cytokinin is
(a) Promote cell division
(b) Wilting of leaves
(c) Promote the opening of stomatal pore
(d) Help in the growth of stem. (2023)

18. Assertion (A): Plant hormones are chemicals produced in plants which help to coordinate growth, development and response to stimulus and environment.
Reason (R): Abscisic acid is a plant hormone that promotes cell division.
(a) Both (A) and (R) are true and (R) is the correct explanation of the assertion (A).
(b) Both (A) and (R) are true, but (R) is not the correct explanation of the

assertion (A).
(c) (A) is true, but (R) is false.
(d) (A) is false, but (R) is true. (2020 C)

VSA (1 mark)

19. State one example of chemotropism. (Board Term 1, 2015) R

SAI (2 marks)

20. Where are auxins synthesised in a plant? Which organ of the plant shows:
(i) Positive phototropism
(ii) Negative geotropism
(iii) Positive hydrotropism (2023)

21. Name a plant hormone responsible for bending of a shoot of a plant when it is exposed to unidirectional light. How does it promote phototropism? (2023)

22. How do auxins promote the growth of a tendril around a support? (2019)

23. State the two types of movements seen in plants. Give one example of each type. (Board Term I, 2016)

SA II (3 marks)

24. Define geotropism. Draw a labelled diagram of a plant showing geotropic movement of its parts. (2020)

25. State the function of each of the following plant hormones :
(a) Gibberellins
(b) Auxins
(c) Abscisic acid (2019 C)

26. What are plant hormones? Name the plant hormones responsible for the following:
(i) Growth of stem
(ii) Promotion of cell division
(iii) Inhibition of growth
(iv) Elongation of cells (NCERT, Delhi 2019)

27. Define phototropism. Name the plant hormone which is responsible for phototropism. (NCERT, Board Term I, 2016)

LA (5 marks)

28. (a) What are phytohormones? List four types of phytohormones. Where are these hormones synthesised?
(b) What happens when a growing plant detects light? Explain in brief. (Board Term I, 2017)

29. List the sequences of events that occur when a plant is exposed to unidirectional light, leading to bending of a growing shoot. Also name the hormone synthesised and the type of movement that takes place. (Board Term 1, 2016)

30. (a) Define reflex arc. Draw a flow chart showing the sequence of events which occur during sneezing.
(b) List four plant hormones. Write one function of each. (Board Term 1, 2014)

6.3 Hormones in Animals

VSA (1 mark)

31. Answer question numbers 31(i) to 31(iv) on the basis of your understanding of the following information and related studied concepts:
Thyroid gland is a bilobed structure situated in our neck region. It secretes a hormone called thyroxine. lodine is necessary for the thyroid gland to make thyroxine. Thyroxine regulates carbohydrates, protein and fat metabolism in the body. It promotes growth of body tissues also. When there is an excess of thyroxine in the body, a person suffers from hyperthyroidism and if this gland is underactive it results in hypothyroidism. Hyperthyroidism is diagnosed by blood tests that measure the levels of thyroxine and Thyroid Stimulating Hormone (TSH). Hypothyroidism is caused due to the deficiency of iodine in our diet resulting in a disease called goitre. lodised salt can be included in our diet to control it.
(i) Where is thyroid gland situated?
(ii) State the function of thyroxine in human body.
(iii) What is hyperthyroidism?
(iv) How can we control hypothyroidism? (2020)

32. Question numbers 32(i) to 32(iv) are based on table given below:
Study the table in which the levels of Thyroid Stimulating Hormone (TSH) in

women are given and answer the questions that follow on the basis of understanding of the following paragraph and the related studied concepts:

Age Range	Normal (mU/L)	Low (mU/L)
18-29 years	0.4-2.34 mU/L	< 0.4 mU/L
30-49 years	0.4-4.0 mU/L	< 0.4 mU/L
50-79 years	0.46-4.68 mU/L	< 0.46 mU/L

Women are at greater risk for developing abnormal TSH levels during menstruation, while giving birth and after going through menopause. Around 5% of women in the United States have some kind of thyroid problem compared to 3% of men. Despite claims that high TSH increases your risk for heart disease, a 2013 study found no link between high TSH and heart diseases. But a 2017 study showed that older women are especially at risk for developing thyroid cancer if they have high TSH levels along with thyroid nodules.

(i) A 35 years old woman has TSH level 6.03 mU/L. What change should she bring in her diet to control this level?

(ii) When do women face a greater risk of abnormal TSH level?

(iii) State the consequence of low TSH level.

(iv) Name the mineral that is responsible for synthesis of hormone secreted by thyroid gland. (2020)

33. Question numbers 33(i) to 33(iv) are based on the table and related information in the passage given below:

Thyroid Stimulating Hormone (TSH) stimulates thyroid gland to produce thyroxine. Study the table given below.

Table : TSH levels during pregnancy

Stage of pregnancy	Normal (mU/L)	Low (mU/L)	High (mU/L)
First trimester	0.2-2.5	< 0.2	2.5 - 10
Second trimester	0.3-3.0	< 0.3	3.01 - 4.5
Third trimester	0.8-5.2	< 0.8	> 5.3

It is important to monitor TSH levels during pregnancy. High TSH levels and hypothyroidism can especially affect chances of miscarriage. Therefore, proper medication in consultation with a doctor is required to regulate/control the proper functioning of the thyroid gland.
(i) Give the full form of TSH.
(ii) State the main function of TSH.
(iii) Why do TSH levels in pregnant women need to be monitored?
(iv) A pregnant woman has TSH level of 8.95 mU/L. What care is needed for her? (2020)

SA II (3 marks)

34. 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. (2020)

35. Why is chemical communication better than electrical impulses as a means of communication between cells in a multicellular organisms? (2020)

36. A cheetah, on seeing a prey moves towards him at a very high speed. What causes the movement of his muscles? How does the chemistry of cellular components of muscles change during this event? (2020)

37. Name the hormones secreted by the following endocrine glands and specify one function of each:
(a) Thyroid
(b) Pituitary
(c) Pancreas. (2018)

41. (a) Complete the following table:

	Name of the hormone	Gland which secretes the hormone	Functions of the hormone
(i)	Thyroxine	Thyroid	_____
(ii)	Growth Hormone	_____	Regulates growth and development of the body
(iii)	Insulin	Pancreas	_____

(b) List three characteristics of animal hormones. (Board Term 1, 2015)

LA (5 marks)

42. (a) Name the hormone secreted by (i) Pituitary, and (ii) Thyroid stating one main function of each. Name the disorder a person is likely to suffer from due to the deficiency of the above mentioned hormones.
(b) How is the timing and amount of hormone released regulated? Explain with an example. (2020 C)

43. (a) Name one organ each where growth hormone is synthesised in man and plant.
(b) 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. (2020)

CBSE Sample Questions

6.1 Animals-Nervous System

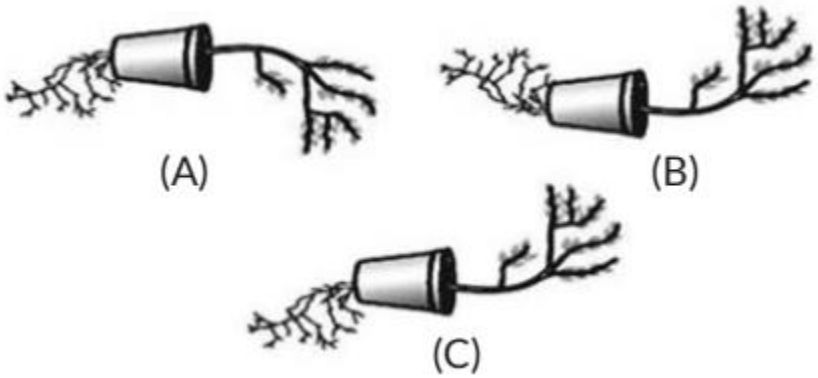
SAI (2 marks)

1. How is the mode of action in beating of the heart different from reflex actions? Give four examples. (2022-23)

6.2 Coordination in Plants

MCQ

2.Observe the three figures given below. Which of the following depicts tropic movements appropriately?



SOLUTIONS

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

2. (c) Gustatory receptors are for taste and are present in tongue.

3. (c): The main thinking part of brain is cerebrum (a part of forebrain). It has sensory, motor and association area.

4. (i) Cerebellum
(iii) Cerebrum
(ii) Medulla oblongata
(iv) Medulla oblongata

5. (a) Brain and spinal cord are protected by skeleton- brain by the cranium and spinal cord by vertebral column.
(b) (i) Medulla - It controls involuntary actions like heart beat, respiration, etc.
(ii) Cerebellum - It maintains posture and balance of body.

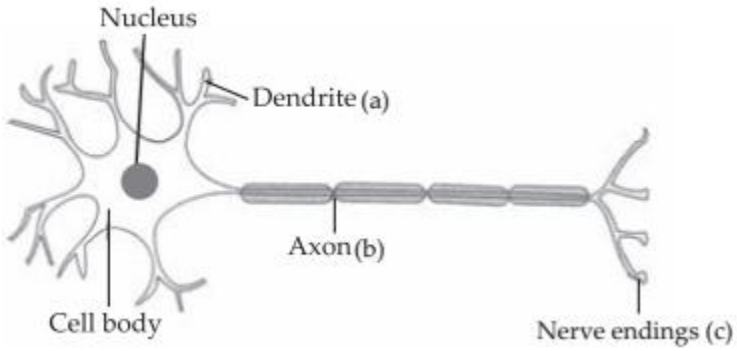
6. A nerve impulse is a gradual physicochemical change in a nerve fibre's membrane that occurs after stimulation. This impulse travels from the dendrite to the cell body and then along the axon to its end.

7. (a) Gustatory receptors are receptors for taste present in taste buds on tongue and olfactory receptors are the receptors for smell present in nasal chambers.
(b) In the given flow chart, 'a' is cyton (cell body) and 'b' is axon.

8. (a) Sensory neuron: These often occur in sense organs and receive stimuli through their dendrites. The sensory neurons transmit impulses towards the central nervous system (brain and spinal cord) with the help of their axons.
(b) Cranium: The bones of cranium or brain box protect the brain from mechanical injury.
(c) Vertebral column: Major function of the vertebral column is protection of the spinal cord and carries the weight of the upper body.
(d) Motor neuron: The dendrites of these neurons synapse with axons of interneurons in central nervous system. They transmit impulses from central

nervous system towards effectors (muscles or glands). The latter respond to stimuli.

9. Diagrammatic representation of a neuron is as follows:



10. At the synapse (functional junction between neurons), axon terminal comes in close proximity to the dendron terminal of next neuron. Axon terminal is expanded to form pre-synaptic knob and the other dendrite terminal forms post-synaptic depression. In between the two, lies a narrow fluid filled space called synaptic cleft. As the nerve impulse reaches the pre-synaptic knob, the synaptic vesicles get stimulated to release neurotransmitter in the synaptic cleft. The neurotransmitter molecules diffuse across the gap to come in contact with post-synaptic membrane. In this way, nerve impulse passes across the minute gap to stimulate dendron of other neuron. The synapse acts as a one-way valve to conduct impulse in one direction only. This is so because chemical substance called neurotransmitter is secreted only on one side of the gap, i.e., on axon's side. It carries impulse across the synapse and passes it to the dendron of the other neuron. In this way, impulses travel across the neurons only in one direction, i.e., from axon of one neuron to dendron of other neuron through a synapse.

11. Distinguishing features between cerebrum and cerebellum:

S. No.	Cerebrum	Cerebellum
(i)	It is the part of forebrain.	It is the part of hindbrain.
(ii)	It is the largest part constituting 80% of the brain.	It is much smaller, constituting 12.5% of the brain.
(iii)	It forms the front, superior and lateral sides of the brain.	It lies in the posterior region of the brain.
(iv)	It has two parts called cerebral hemispheres.	It has three parts: two lateral cerebellar hemispheres and one central vermis.
(v)	It has two cavities called lateral ventricles.	Cavity is nearly absent.
(vi)	Cerebrum is the seat of intelligence and memory.	Cerebellum coordinates muscular activity.
(vii)	It controls movements, speech, sight, smell, taste, hearing, intelligence, etc.	It maintains equilibrium of the body.

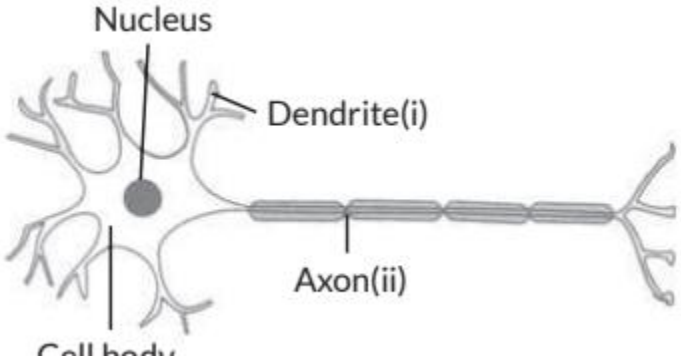
(Any three)

12. Reflex action is an automatic and spontaneous response to a stimulus. The pathway taken by nerve impulses and responses in a reflex action is called a reflex arc. It consists of receptor, sensory nerve (afferent), spinal cord, motor nerve (efferent) and effector (muscles or glands). Reflex arc is evolved in animals because the thinking process of the brain is not fast enough. Reflex arc enables the body to give quick responses to harmful stimuli so that chances of damage to body are decreased. It also prevents overloading of brain, so prevents its fatigue. Many animals have very little or none of the complex neuron network needed for thinking. So, it is likely that reflex arc has evolved as an efficient way of functioning in the absence of true

thought processes. However, even after complex neuron networks have came into existence, reflex arcs continue to be more efficient for quick responses. Reflex action controlled by spinal cord and brain are spinal and cerebral reflex action.

13. (a) The pathway taken by the nerve impulses in a reflex action, from receptor organ to spinal cord and back to effector organ of reflex action is called reflex arc. Receptor organ could be a sense organ such as eyes, skin, etc., and effector organ could be muscles, glands, etc.
(b) When a bright light is focussed on eye, receptor cell receives the stimulus and an impulse is generated. This impulse is passed on to sensory neuron, then it goes to brain, brain sends the impulse to the motor neuron which contracts the pupil. Sequence of events can be summarised as: Photoreceptors in eye → Sensory (Receptor) neuron → Brain → Motor (Effector) neuron → Eye muscle → Constriction of pupils

14. (a) Diagrammatic representation of a neuron is asfollows:



(b) (i) Forebrain which includes cerebrum, olfactory lobes and diencephalon, is the main thinking part of the brain.
(ii) Cerebellum, part of hindbrain is responsible for maintaining the posture and balance of the body.

15. Brain is divided into three main regions: forebrain, midbrain and hindbrain.
(i) Forebrain consists of cerebrum, olfactory lobes and diencephalon. Its main function is thinking and controlling various activities such as touch, smell, hearing, speech and sight.
(ii) Midbrain controls reflex movements of the head, neck and trunk in response to visual and auditory stimuli.
(iii) Hindbrain has three centres called pons, cerebellum and medulla. This

part is responsible for regulating respiration, maintaining posture and balance of body and controlling involuntary actions such as heartbeat, breathing, swallowing, coughing, sneezing, vomiting, etc.

16. Central nervous system consists of brain and spinal cord. It contains centres for controlling various activities of the body. Peripheral nervous system consists of cranial nerves and spinal nerves. Components of the central nervous system are protected by:
(i) Brain is contained within the skull while the spinal cord is encircled by a series of vertebrae.
(ii) Meninges are a succession of tissue layers that reside within these bony structures.
(iii) Cerebrospinal fluid (CSF) is a clear, colourless, slightly alkaline fluid that surrounds the brain and spinal cord that protects from infections. 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.

17. (a & c): Abscisic acid (ABA) promotes wilting of leaves Auxins and gibberellins promote stem and fruit growth.

18. (c) Plant hormones are chemicals present in plants which help to coordinate growth, development and responses to stimuli and environment. For example, auxins, gibberellins, cytokinins, abscisic acid are different plant hormones. Abscisic acid or ABA is a plant hormone or phytohormone which acts as growth inhibitor. It promotes dormancy in seeds and buds, abscission (falling of leaves) and senescence in leaves and thus inhibits growth of plant. Cytokinins promote cell division.

19. Growth of pollen tube towards the ovule due to chemical stimulus during the process of fertilisation in a flower is an example of chemotropism.

20. Auxin is synthesised at tip of the stem apices or Shoots
(i) shoots.
(ii) Shoots
(iii) Roots (bend towards water)

21. Auxin is responsible for bending of a shoot of a plant when it is exposed to unidirectional light.

In the presence of sunlight, the auxin present in the stem starts accumulating in the region away from sunlight, due to which the concentration of auxin in the region of the stem increases, resulting in bending of a shoot of a plant when it is exposed to unidirectional light. Thus, auxin promote phototropism that is the regulation of physiology or development in response to day length.

22. When tendrils come in contact with any support, the part of the tendril in contact with the object does not grow as rapidly as the part of the tendril away from the object. This is caused by the action of auxin hormone. Less auxin occurs on the side of contact as compared to the free side. As a result, auxin promotes growth on the free side and the tendrils coil around the support.

23. Two types of movements seen in plants are:
(i) Nastic movements are movements independent of growth that are non-directional and occur due to turgor changes, e.g., closing of leaves in response to touch stimulus in 'touch me not' plant.
(ii) Tropic movements or tropism are movements due to growth, that are directional and very slow, e.g., movement of a part of the plant in response to light.

24. Geotropism refers to the upward and downward growth of shoots and roots respectively in response to the pull of earth or gravity. If the plant part moves in the direction of gravity, it is called positive geotropism. Likewise, if the plant part moves against the direction of gravity, it is termed as negative geotropism. A well labelled diagram of plant showing geotropism is:

25. (a) In genetically dwarf plants, the length of internode is very much reduced but the number of nodes remains the same. Gibberellins overcome the phenotypic expression of dwarfism in certain plants. Besides general increase in stem length, gibberellins specifically induce internodal growth in some genetically dwarf varieties of plants like pea and maize. Gibberellins, however, have little or no effect when they are applied to the normal plant.
(b) Auxin is the plant hormone which promote cell enlargement and cell differentiation in plants. It also plays a role in apical dominance (i.e., the phenomenon in which presence of apical bud does not allow the nearby lateral buds to grow). When the apical bud is removed, the lateral buds sprout. This produces dense bushy growth. The phenomenon is widely used in tea plucking. Apical bud inhibits the growth of lateral buds by releasing auxins.
(c) Abscisic acid or ABA is a plant hormone or phytohormone which acts as growth inhibitor. It promotes dormancy in seeds and buds, abscission (falling of leaves) and senescence in leaves and thus inhibits growth of plant.

26. Plant hormones or phytohormones are chemical substances produced naturally in plants and capable of translocation and regulating one or more physiological processes when present in low concentration. These are also known as plant growth substances or plant growth regulators. The plant hormones responsible for different functions are as follows:
(i) Growth of stem: Gibberellins (Gibberellic acid) promote growth in stems.
(ii) Promotion of cell division: Cytokinins promote cell division in plants.
(iii) Inhibition of growth: ABA (Abscisic acid) promotes dormancy in seeds as well as in buds and thus inhibits growth.
(iv) Elongation of cells: Auxin and cytokinin both cause cell elongation.

27. Phototropism is the movement of a part of the plant in response to light. Shoots generally grow towards light and are said to be positively phototropic, while roots grow away from light and are said to be negatively phototropic. The growth movement of the plant part (stem) is caused by the action of auxin hormone. Auxin causes cell elongation. Thus, causing growth of stem towards the light stimulus.

28. (a) Phytohormones are chemical substances produced naturally in plants and are capable of translocation and regulating one or more physiological processes when present in low concentration. Plant hormones help to coordinate growth, development and responses to the environment. Plant

hormones are also known as plant growth substances or plant growth regulators.
Types of hormone and their site of synthesis are as follows:

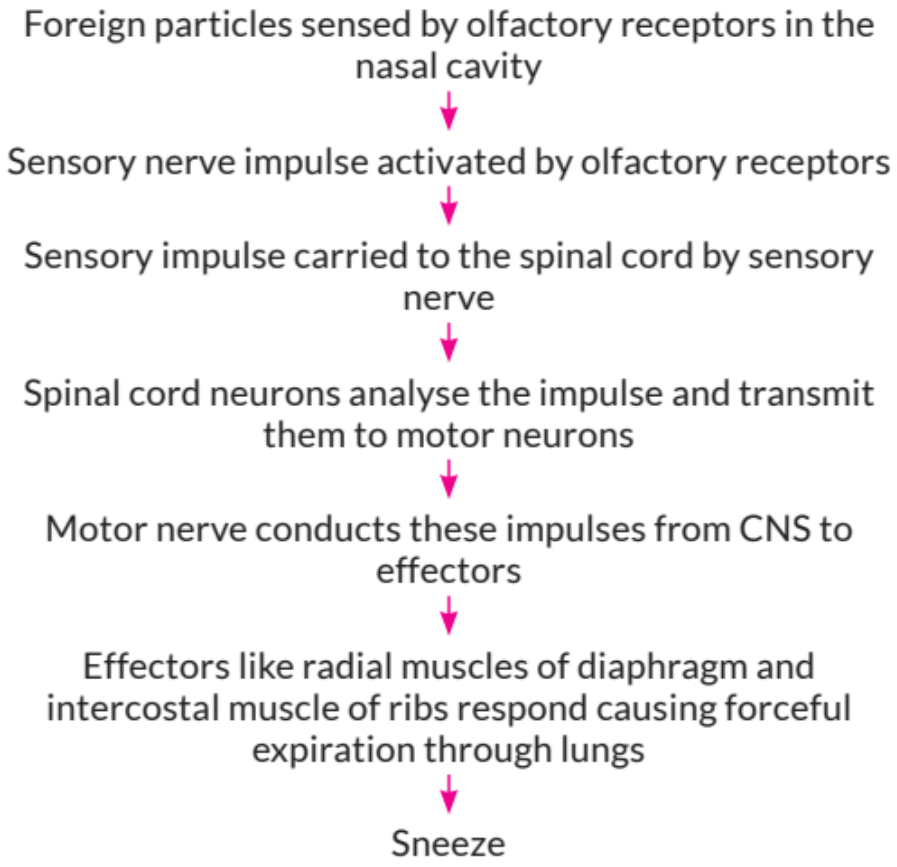
S. No.	Plant hormone	Site of Synthesis
(i)	Auxin	Auxin hormone is synthesised by the meristematic tissue at the tip of the stem and roots.
(ii)	Gibberellins (Gibberellic acid)	Gibberellins are synthesised in young leaves, roots and shoots and transported to other parts of the plant.
(iii)	Cytokinin	It is synthesised in roots and transported to shoot region through xylem.
(iv)	Ethylene	It is formed in almost all plant parts - roots, leaves flowers, fruits, seeds, etc.

(b) Plants respond to light by showing growth movement towards light (phototropism). This growth movement of the plant part (stem) is caused by the action of auxin hormone. The auxin hormone is synthesised in the meristematic tissues at the tip of the stem. Auxin diffuses uniformly down the stem in plants that are kept in the open and receive sunlight from above. Due to presence of auxin equally on both the sides, the stem grows up straight because both the sides of the stem show growth at the same place. But when sunlight is unidirectional, auxin gets accumulated towards the shady region of the shoot. This causes the cells to elongate and stem to bend towards light.

29. (i) When a plant is exposed to unidirectional light, the shoot tips synthesise phytohormone called auxin.
(ii) Auxins slowly diffuse towards the shady side.
(iii) As auxins help the plant to grow, cells on the shady side grow longer than the ones which are exposed to light.

(iv) Hence, causing the plant to bend towards light. This type of movement caused due to hormone auxin is called phototropism.

30. (a) Reflex arc is defined as the pathway or route taken by nerve impulses in a reflex action. Sequences of events that occur during sneezing can be depicted as:



(b) Four plant hormones are:
(i) Auxins: These promote cell enlargement and cell differentiation in plants. These also promote stem and fruit growth.
(ii) Gibberellins: These promote cell enlargement and cell differentiation in plants in the presence of auxins. These also promote growth in stems and fruits.
(iii) Cytokinins: These promote cell division in plants. These play vital role in the morphogenesis in plants.
(iv) Ethylene: It promotes ripening of fruits. It helps in breaking the dormancy in buds and seeds.

31. (i) Thyroid gland is situated in our neck region.
(ii) Thyroxine regulates carbohydrate, protein and fat metabolism in the body. It promotes growth of body tissues also.
(iii) Hyperthyroidism occurs when there is excess of thyroxine in the body.
(iv) Hypothyroidism can be controlled by using iodised salt.

32. (i) A 35 year old woman with TSH level 6.03 mU/L
means she is suffering from hyperthyroidism. Iodised salt
can be reduced in her diet to control it.
(ii) Women are at greater risk for developing abnormal TSH levels during menstruation, while giving birth and after going through menopause.
(iii) Low TSH level causes goitre.
(iv) lodine is necessary for the thyroid gland to make thyroxine hormone.

33. (i) The full form of TSH is Thyroid Stimulating Hormone.
(ii) TSH stimulates thyroid gland to produce thyroxine.
(iii) TSH levels in pregnant women need to be monitored as high TSH levels and hypothyroidism can increase chances of miscarriage.
(iv) A pregnant women with high TSH level needs proper medication in consultation with a doctor to control the proper functioning of thyroid gland.

34. When squirrel is in a scary situation then its nervous system stimulates the adrenal glands to secrete more adrenaline hormone into blood. This adrenaline hormone increases heartbeat, breathing rate, blood flow into muscles and causes liver to put more stored glucose into its blood. All these actions of adrenaline hormone produces a lot of energy in squirrel's body. In this way, squirrel prepares itself for fighting or running away action.

35. In animals, the message communicated in the form of nerve impulses, from receptors to central nervous system and from latter to effectors is very quick. But nerve impulses can reach only those animal cells which are connected by the nervous tissue. These cells after generation and transmission of nerve impulses, take some time to reset their mechanism before a new impulse is generated and transmitted. It means, cells cannot continuously generate and transmit electrical impulses. This is the reason most multicellular organisms use another means of communication called chemical communication. In chemical communication, information spreads out throughout the body by

blood and its effects lasts longer. Chemical communication is however slow, but it can reach all the cells of body regardless of nervous connections.

36. The cheetah senses its prey by photoreceptors and the information is sent to the central nervous system. The response is then carried by neurons. Along with nervous system, the hormonal system also plays a role. Adrenaline hormone produced by the adrenal glands triggers the flight or fight action. On seeing a prey, these hormones are released into the cheetah's bloodstream. It speeds up heartbeat, breathing increases blood flow into leg muscles and causes liver to put more stored glucose into cheetah's blood. All these actions of adrenaline hormone produces a lot of energy which helps cheetah to run fast.

37. (a) Thyroid gland secrete three hormones: thyroxine (T4), triiodothyroxine (T3) and calcitonin. Thyroxine and triiodothyronine maintain the basal metabolic rate (BMR) of the body by regulating the rate of oxidation of carbohydrates, fats and proteins and production of energy in our body. They promote growth of body tissues and development of mental faculties. (b) Pituitary secretes hormones GH, TSH, ACTH, FSH, LH, PRL, MSH, oxytocin and vasopressin. Growth hormone (GH) or somatotropic hormone controls the overall development of body, muscles, bones and tissues.
(c) Pancreas (both exocrine and endocrine, i.e., mixed gland) contains specialised cells which secrete two major hormones insulin and glucagon. Insulin regulates the conversion of glucose to glycogen, i.e., it lowers the blood glucose level. Glucagon increases the blood glucose level.

38. (a) The endocrine system consists of specialised glands (endocrine glands) which brings about control by sending chemical messengers termed hormones. These glands secrete hormones directly into the blood. Hormones reach the target organs via blood and regulate the activities of these organs, thus coordinating the functioning of living organisms and also their growth.
(b) lodine is necessary for the making of thyroxine hormone by thyroid gland. Therefore, deficiency of iodine in the diet can cause deficiency of thyroxine hormone in the body.

39. (a) Old man who is advised by his doctor to take less sugar in his diet is suffering from diabetes mellitus that occurs due to imbalance of insulin hormone. Endocrine part of islets of Langerhans in pancreas secrete insulin

hormone.
(b) Growth hormone (GH) or somatotropic hormone (SH) is secreted by pituitary gland. Effect of the following on a person:
(i) Deficiency of growth hormone (hypoactivity) causes dwarfness.
(ii) Excess secretion of growth hormone (hyperactivity) causes excessive growth of bones making the person very tall (gigantism).

40. (a) The hormone that lowers blood sugar (Glucose) level is insulin. The function of insulin hormone is to lower the blood sugar level (or blood glucose level, i.e., it controls the metabolism of sugar. It is secreted by the endocrine part of pancreas called islets of Langerhans.
(b) Testes secretes the male sex hormone called testosterone, which is responsible for development of male sex organs and male features such as deeper voice, moustache, beard and body hair.
(c) Thyroxine hormone is synthesised by thyroid gland. Thyroxine controls the rate of metabolism of carbohydrates, fats and proteins.

41. (a) (i) Functions of thyroxine hormone is regulation of carbohydrates, protein and fat metabolism.
(ii) Gland that secretes growth hormone is pituitary gland.
(iii) Function of insulin is to regulate the conversion of glucose to glycogen, i.e., it lowers blood glucose level.
(b) Three characteristics of animal hormones are:
(i) Hormones are synthesised by endocrine glands and secreted directly into the bloodstream.
(ii) They are produced at a place other than the site of action. They travel through blood and have specific action on a specific target organ.
(iii) Chemically, the hormones may be peptides, proteins, amines or steroids.

42. (a) (i) Pituitary secretes hormones GH, TSH, ACTH, FSH, LH, PRL, MSH, oxytocin and vasopressin. Growth hormone (GH) or somatotropic hormone controls the overall development of body, muscles, bones and tissues. Disorder related to thyroid gland: Goitre (enlarged thyroid gland) can occur due to inadequate dietary intake of iodine which result in low level of thyroid hormones (since iodine is essential to make thyroid hormones). Low levels of thyroid hormones stimulates pituitary gland to secrete more TSH, which causes thyroid gland enlargement. Hyposecretion of growth hormone (GH) during growth year results into dwarfism. This could happen due to the

hypoactivity of the pituitary gland.
(ii) Thyroid gland secrete three hormones : thyroxine (T4), triiodothyroxine (T3) and calcitonin. Thyroxine and triiodothyronine maintain the basal metabolic rate (BMR) of the body by regulating the rate of oxidation of carbohydrates, fats and proteins and production of energy in our body. They promote growth of body tissues and development of mental faculties.
(b) Both the timing and amount of hormone released are regulated by feedback mechanism. For example, the pancreas involved in the secretion and release of hormone insulin when the positive feedback is signalled by the increased blood glucose level, the insulin sequesters the glucose in adipose tissue and liver cells as glucose and fats respectively. When the blood glucose level decreases, the negative feedback will signal the pancreas to stop the secretion of insulin.

43. (a) In man, growth hormone is synthesised by pituitary gland which is present below the brain. Growth hormone controls the growth of human body. In plants, auxins promote the plant growth. Auxins are produced by growing apices of the stems and roots. They migrate to the regions of their action, and initiate cell division and cell elongation.
(b) Refer to answer 29.

CBSE Sample Questions

1. The differences between mode of action in beating of heart and reflex action is given in the following table:

S. No.	Beating of a heart	Reflex actions
(i)	Heart beating is an involuntary action which is not controlled by our will.	Reflex actions are the sudden action in response to something.
(ii)	It does not require any kind of stimulus to work.	They require stimulus for its action.
(iii)	It is regulated by the brain.	These actions are regulated by the spinal cord.
(iv)	It does not involve skeletal muscle.	They do involve skeletal muscle.
(v)	It is performed throughout the course of one's life.	These actions are produced in response to an event of an emergency.
(vi)	This action may be quick or slow.	Reflex actions are always quick.

(Any four (2)

2. (d): Figure (C) depicts tropic movements correctly as in this figure the roots are positively geotropic whereas the shoots are negatively geotropic. (1)