

UNIQUE STUDY POINT

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Class: X	Subject: Science	Session: 2025-26
Chapter: 06 - Control and Coordination	Time: 1½ Hours	Max. Marks: 40

General Instructions:

1. All questions are compulsory.
2. This question paper contains 20 questions divided into five sections A, B, C, D and E.
3. Section A contains 10 MCQs of 1 mark each.
4. Section B contains 4 questions of 2 marks each.
5. Section C contains 3 questions of 3 marks each.
6. Section D contains 1 question of 5 marks.
7. Section E contains 2 Case Study Based questions of 4 marks each.

SECTION A - Multiple Choice Questions (1 mark each)

Q1. Which part of the neuron receives information from other neurons?

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

Q2. The gap between two neurons where chemical transmission occurs is called:

- (a) Axon terminal
- (b) Synapse
- (c) Dendrite
- (d) Node

Q3. Which type of receptors detect taste?

- (a) Olfactory receptors
- (b) Photoreceptors
- (c) Gustatory receptors
- (d) Thermoreceptors

Q4. Reflex arcs are formed in:

- (a) Brain
- (b) Spinal cord
- (c) Muscles
- (d) Receptors

Q5. The part of the brain responsible for precision of voluntary actions and maintaining posture is:

- (a) Cerebrum
- (b) Medulla
- (c) Cerebellum
- (d) Pons

Q6. Which plant hormone promotes cell division?

- (a) Auxin
- (b) Gibberellin
- (c) Cytokinin
- (d) Abscisic acid

Q7. The directional growth movement of a plant part in response to light is called:

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

Q8. Which hormone regulates blood sugar levels in humans?

- (a) Thyroxin
- (b) Insulin
- (c) Adrenaline
- (d) Growth hormone

Q9. Iodine is necessary for the synthesis of which hormone?

- (a) Growth hormone
- (b) Insulin
- (c) Thyroxin
- (d) Adrenaline

Q10. The hormone secreted during emergency situations to prepare the body for fight or flight response is:

- (a) Insulin
- (b) Thyroxin
- (c) Adrenaline
- (d) Testosterone

SECTION B - Short Answer Questions (2 marks each)

Q11. What is the significance of the vertebral column in protecting the nervous system?

Q12. Why does our mouth water when we see our favourite food? Name the type of response involved.

Q13. Explain how the sensitive plant (*Mimosa pudica*) responds to touch despite having no nervous system.

Q14. What is the role of auxin in the phototropic response of plants?

SECTION C - Short Answer Questions (3 marks each)

Q15. Differentiate between voluntary and involuntary actions with one example of each.

Q16. Describe the structure of a neuron with the help of a labeled diagram.

Q17. Explain how feedback mechanism regulates hormone secretion in our body. Give an example.

SECTION D - Long Answer Question (5 marks)

Q18. Describe the pathway of a reflex arc when you accidentally touch a hot object. Draw a labeled diagram to support your answer.

SECTION E - Case Study Based Questions (4 marks each)

Q19. Case Study 1: Ravi noticed that when he entered a dark room from bright sunlight, he couldn't see anything initially, but after a few minutes, his eyes adjusted and he could see objects in the dim light. Similarly, when bright light was suddenly focused on his eyes, his pupils became smaller.

Based on this observation, answer the following questions:

- (a) What type of receptors are involved in detecting light? (1 mark)
- (b) Which part of the eye responds to changes in light intensity? (1 mark)
- (c) Is the pupil response a reflex action or voluntary action? Justify your answer. (2 marks)

Q20. Case Study 2: A gardener observed that when he planted seeds in a horizontal position, the roots always grew downward into the soil while the shoots grew upward toward the sky, regardless of the seed's orientation. He also noticed that plants near the window bent towards the light source.

Based on this observation, answer the following questions:

- (a) What type of tropism is shown by roots growing downward? (1 mark)
- (b) Which plant hormone is responsible for bending of shoots towards light? (1 mark)
- (c) Explain how unequal distribution of this hormone causes bending movement. (2 marks)

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SECTION A - Answers to MCQs

Ans 1. (c) Dendrite

Dendrites are the branched projections of neurons that receive information from other neurons through synapses.

Ans 2. (b) Synapse

The synapse is the gap between two neurons where electrical impulses are converted to chemical signals for transmission.

Ans 3. (c) Gustatory receptors

Gustatory receptors located on the tongue detect taste, while olfactory receptors detect smell.

Ans 4. (b) Spinal cord

Reflex arcs are formed in the spinal cord where sensory and motor neurons meet, allowing for quick responses without involving the brain.

Ans 5. (c) Cerebellum

The cerebellum is responsible for precision of voluntary actions and maintaining posture and balance of the body.

Ans 6. (c) Cytokinin

Cytokinins promote cell division and are present in greater concentration in areas of rapid cell division like fruits and seeds.

Ans 7. (b) Phototropism

Phototropism is the directional growth movement of plant parts in response to light. Shoots show positive phototropism while roots show negative phototropism.

Ans 8. (b) Insulin

Insulin, produced by the pancreas, regulates blood sugar levels by controlling glucose uptake by cells.

Ans 9. (c) Thyroxin

Iodine is essential for the thyroid gland to synthesize thyroxin hormone, which regulates metabolism in the body.

Ans 10. (c) Adrenaline

Adrenaline is secreted by adrenal glands during emergencies to prepare the body for fight or flight response.

SECTION B - Answers to Short Answer Questions

Ans 11.

The vertebral column or backbone is a bony structure that runs down the middle of the back. It protects the spinal cord by encasing it within its hollow cavity. The spinal cord is a delicate bundle of nerves that carries signals between the brain and the rest of the body. The vertebral column provides physical protection from external injuries and mechanical damage, ensuring the proper functioning of the nervous system.

Ans 12.

When we see our favourite food, our mouth waters due to an involuntary reflex action controlled by the nervous system. The sight of food stimulates receptors in our eyes, which send signals to the brain. The brain then sends signals to the salivary glands to secrete saliva. This is an involuntary action as it occurs automatically without conscious thought or control.

Ans 13.

The sensitive plant (*Mimosa pudica*) responds to touch through a mechanism involving changes in water content of cells. When touched, information is transmitted from cell to cell using electrical-chemical signals. Unlike animals, plants do not have specialized nervous tissue. The cells at the base of the leaves change their water content, causing swelling or shrinking, which leads to the folding and drooping of leaves. This is an immediate response not involving growth.

Ans 14.

Auxin is a plant hormone synthesized at the shoot tip. When light falls on the plant from one side, auxin diffuses toward the shady side of the shoot. The higher concentration of auxin on the shady side stimulates those cells to grow longer than the cells on the illuminated side. This unequal growth causes the shoot to bend toward the light source, demonstrating positive phototropism.

SECTION C - Answers to Short Answer Questions

Ans 15.

Voluntary Actions: These are actions that occur under conscious control and require thinking. Example: Writing, talking, walking, or picking up a book. These actions are controlled by the cerebrum of the forebrain.

Involuntary Actions: These are actions that occur without conscious thought or control. Example: Heartbeat, breathing, digestion, or blood pressure regulation. These actions are controlled by the medulla in the hindbrain and occur automatically to maintain life processes.

Ans 16.

Structure of a Neuron:

A neuron consists of three main parts:

1. **Cell Body:** Contains the nucleus and cytoplasm. It is the metabolic center of the neuron.
2. **Dendrites:** Short, branched projections that receive information from other neurons or receptors.
3. **Axon:** A long fiber that transmits electrical impulses away from the cell body toward other neurons, muscles, or glands.

At the end of the axon are nerve endings that form synapses with other cells. The electrical impulse travels from dendrite → cell body → axon → nerve ending, where it is converted into a chemical signal to cross the synapse.

[Students should draw a labeled diagram showing dendrites, cell body, nucleus, axon, and nerve

endings]

Ans 17.

Feedback mechanism is a regulatory system that maintains hormone levels within optimal ranges. The mechanism works as follows:

When hormone levels in blood become too high or too low, the body detects this change and responds by either increasing or decreasing hormone secretion accordingly.

Example - Insulin Regulation:

When blood sugar levels rise after eating, cells in the pancreas detect this increase and secrete more insulin. Insulin helps cells absorb glucose from the blood, lowering blood sugar levels. When blood sugar levels fall to normal, insulin secretion is reduced. This negative feedback ensures blood sugar remains balanced.

SECTION D - Answer to Long Answer Question

Ans 18.

Pathway of Reflex Arc (Touching a Hot Object):

The reflex arc follows this pathway:

Step 1 - Detection: When you touch a hot object, heat receptors (thermoreceptors) in the skin detect the stimulus.

Step 2 - Sensory Neuron: The receptors generate electrical impulses that travel through sensory neurons toward the spinal cord.

Step 3 - Spinal Cord: In the spinal cord, the sensory neuron synapses with a relay neuron, which connects to a motor neuron. The information also travels up to the brain.

Step 4 - Motor Neuron: The motor neuron carries the impulse from the spinal cord to the effector (arm muscles).

Step 5 - Response: The arm muscles contract, pulling the hand away from the hot object.

This entire process happens very quickly (within milliseconds) because the decision to move is made at the spinal cord level, not requiring brain processing. This protects us from injury.

[Students should draw a labeled diagram showing: Hot object → Receptors in skin → Sensory neuron → Spinal cord (relay neuron) → Motor neuron → Effector (muscle in arm) → Hand pulls away. Also show message going to brain]

SECTION E - Answers to Case Study Based Questions

Ans 19.

(a) Photoreceptors (rods and cones) in the retina of the eye detect light.

(b) The pupil (or more precisely, the iris muscles controlling pupil size) responds to changes in light

intensity.

(c) The pupil response is a reflex action. It is involuntary and occurs automatically without conscious control. When bright light enters the eye, the circular muscles of the iris contract reflexively, making the pupil smaller to protect the retina from damage. This happens through a reflex arc involving the optic nerve and brain, demonstrating it is a protective reflex rather than a voluntary action.

Ans 20.

(a) Positive geotropism (or gravitropism). Roots grow in the direction of gravitational pull, showing positive response to gravity.

(b) Auxin is responsible for the bending of shoots toward light.

(c) When light falls on a plant from one side, the auxin hormone synthesized at the shoot tip migrates toward the shady (darker) side. The higher concentration of auxin on the shady side stimulates cell elongation more on that side compared to the illuminated side. This differential growth causes the shoot to bend toward the light source. The cells on the shady side become longer, creating a curve that makes the plant appear to "bend" toward light.

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