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. The main thinking part of the brain is:

(a) Medulla
(b) Pons
(c) Fore-brain
(d) Cerebellum

Q2. Which part of the hindbrain controls involuntary actions like blood pressure and salivation?

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

Q3. The movement of a plant part towards water is called:

(a) Phototropism
(b) Geotropism
(c) Hydrotropism
(d) Thigmotropism

Q4. Which plant hormone inhibits growth and causes wilting of leaves?

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

Q5. The nervous system that connects the central nervous system to the rest of the body is called:

(a) Somatic nervous system
(b) Peripheral nervous system
(c) Autonomic nervous system
(d) Sympathetic nervous system

Q6. Growth hormone is secreted by which gland?

(a) Thyroid gland
(b) Pituitary gland
(c) Adrenal gland
(d) Pancreas

Q7. The hormone responsible for regulating metabolism in the body is:

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

Q8. Which hormone is responsible for changes associated with puberty in males?

(a) Oestrogen
(b) Testosterone
(c) Insulin
(d) Thyroxin

Q9. The growth movement of tendrils in pea plants in response to touch is an example of:

(a) Phototropism
(b) Geotropism
(c) Thigmotropism
(d) Chemotropism

Q10. Deficiency of growth hormone in childhood leads to:

(a) Diabetes
(b) Goitre
(c) Dwarfism
(d) Gigantism

SECTION B - Short Answer Questions (2 marks each)

Q11. What is the difference between the movement of leaves in a sensitive plant and the movement caused by growth in plants?

Q12. Why is the use of iodised salt recommended? What disease can result from iodine deficiency?

Q13. Name the three main regions of the human brain and state one function of each.

Q14. How do plant cells change their shape to cause movement in the sensitive plant?

SECTION C - Short Answer Questions (3 marks each)

Q15. Explain the role of adrenaline hormone in preparing the body during emergency situations.

Q16. What are tropic movements in plants? Differentiate between positive and negative phototropism with examples.

Q17. Why do nerve impulses travel in only one direction along a neuron? Explain with reference to the structure of a neuron.

SECTION D - Long Answer Question (5 marks)

Q18. Describe the structure and functions of different parts of the human brain. Draw a labeled diagram of the human brain.

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

Q19. **Case Study 1:** Rahul's grandmother was diagnosed with diabetes. The doctor advised her to monitor blood sugar levels regularly and prescribed insulin injections. The doctor explained that her pancreas was not producing enough insulin to regulate blood sugar levels properly.

Based on this information, answer the following questions:

(a) Which gland produces insulin in our body? (1 mark)
(b) What is the primary function of insulin? (1 mark)
(c) Explain how feedback mechanism would work in a normal person when blood sugar level rises after eating. (2 marks)

Q20. **Case Study 2:** During a biology practical class, students performed an experiment with bean seedlings. They placed freshly germinated seeds in a cardboard box with an opening on one side facing a window. After three days, they observed that the shoots had bent towards the light coming from the window, while roots grew away from it. When they rotated the box, new growth continued toward the light source.

Based on this experiment, answer the following questions:

(a) What is the phenomenon demonstrated by shoots bending towards light called? (1 mark)
(b) Which hormone is responsible for this response? (1 mark)
(c) Explain why shoots and roots respond differently to the same light stimulus. (2 marks)

DETAILED ANSWER KEY - PAPER 02

SECTION A - Answers to MCQs

Ans 1. (c) Fore-brain

The fore-brain is the main thinking part of the brain that receives and integrates sensory information and controls voluntary actions.

Ans 2. (c) Medulla

The medulla in the hindbrain controls all involuntary actions including blood pressure, salivation, and vomiting.

Ans 3. (c) Hydrotropism

Hydrotropism is the directional growth movement of plant roots toward water sources.

Ans 4. (d) Abscisic acid

Abscisic acid is a growth inhibitor hormone whose effects include wilting of leaves and inhibition of growth.

Ans 5. (b) Peripheral nervous system

The peripheral nervous system consists of cranial and spinal nerves that connect the central nervous system to other parts of the body.

Ans 6. (b) Pituitary gland

The pituitary gland secretes growth hormone which regulates growth and development of the body.

Ans 7. (c) Thyroxin

Thyroxin, produced by the thyroid gland, regulates carbohydrate, protein, and fat metabolism to provide balanced growth.

Ans 8. (b) Testosterone

Testosterone is the male sex hormone responsible for changes during puberty such as deepening of voice and development of male characteristics.

Ans 9. (c) Thigmotropism

Thigmotropism is the directional growth response to touch, as seen in tendrils of pea plants wrapping around supports.

Ans 10. (c) Dwarfism

Deficiency of growth hormone in childhood leads to dwarfism (abnormally short stature), while excess leads to gigantism.

SECTION B - Answers to Short Answer Questions

Ans 11.

Movement in Sensitive Plant: This movement is independent of growth. The leaves move very

quickly in response to touch by changing the amount of water in their cells, causing swelling or shrinking. This is a reversible movement.

Movement Caused by Growth: This movement is dependent on growth and is permanent. It is directional and slower, caused by unequal growth rates in different parts of the plant. Examples include shoots growing toward light (phototropism) and roots growing downward (geotropism).

Ans 12.

Iodised salt is recommended because iodine is essential for the thyroid gland to synthesize thyroxin hormone. Thyroxin regulates metabolism for proper body growth and development. Deficiency of iodine in our diet can lead to goitre, a disease characterized by swelling of the neck due to enlargement of the thyroid gland. Using iodised salt ensures adequate iodine intake to prevent this deficiency disorder.

Ans 13.

The three main regions of the human brain are:

1. Fore-brain: Main thinking part; receives sensory information and controls voluntary actions.

2. Mid-brain: Controls certain involuntary actions and helps coordinate various body parts.

3. Hind-brain: Contains cerebellum (controls balance and posture) and medulla (controls involuntary actions like heartbeat and breathing).

Ans 14.

Plant cells in the sensitive plant change their shape by altering the amount of water inside them. When the plant is touched, electrical-chemical signals are transmitted from cell to cell. This causes certain cells, particularly at the base of leaves, to either gain or lose water rapidly. Cells that gain water swell up, while those that lose water shrink. This differential swelling and shrinking in different parts causes the leaves to fold up and droop, creating the movement we observe.

SECTION C - Answers to Short Answer Questions

Ans 15.

Adrenaline is secreted by the adrenal glands during emergency situations to prepare the body for "fight or flight" response. Its roles include:

1. **Increases heart rate:** The heart beats faster, supplying more oxygen to muscles for immediate action.

2. **Redirects blood flow:** Blood supply to digestive system and skin is reduced, diverting more blood to skeletal muscles that may be needed for running or fighting.

3. **Increases breathing rate:** Contractions of the diaphragm and rib muscles increase, providing more oxygen to the body.

These responses together enable the animal body to respond quickly and effectively to dangerous situations.

Ans 16.

Tropic Movements: These are directional growth movements in plants that occur in response to environmental stimuli such as light, gravity, water, or chemicals. The direction of movement is determined by the direction of the stimulus.

Positive Phototropism: Movement towards light. Example - Shoots and stems bend toward light source to maximize photosynthesis.

Negative Phototropism: Movement away from light. Example - Roots grow away from light, helping them penetrate deeper into soil where water and minerals are available.

These opposite responses to the same stimulus help the plant optimize its growth pattern for survival.

Ans 17.

Nerve impulses travel in only one direction along a neuron due to its structural organization:

1. **Dendrites** are specialized to receive information from other neurons or receptors.

2. The **cell body** processes this information and generates an electrical impulse.

3. The **axon** is specialized to conduct impulses away from the cell body toward the nerve endings.

4. At the **nerve endings**, the electrical impulse triggers release of chemical neurotransmitters that cross the synapse to stimulate the next neuron.

Since synapses can only transmit signals in one direction (from axon terminal of one neuron to dendrite of next), this ensures unidirectional flow of information throughout the nervous system.

SECTION D - Answer to Long Answer Question

Ans 18.

Structure and Functions of Human Brain:

The human brain has three main regions:

1. FORE-BRAIN:
Structure: The largest part, consisting of cerebrum and associated areas.
Functions:
- Main thinking and reasoning center
- Receives sensory information (sight, hearing, smell, taste, touch)
- Has association areas that interpret information
- Controls voluntary movements
- Contains centers for hunger, thirst, and other sensations
- Involved in memory, learning, and emotions

2. MID-BRAIN:
Structure: Small region connecting fore-brain and hind-brain.
Functions:
- Controls some involuntary actions
- Coordinates visual and auditory reflexes

• Helps in muscle movement coordination

3. HIND-BRAIN:

Structure: Consists of cerebellum, pons, and medulla.

Functions:

• **Cerebellum:** Controls precision of voluntary actions, maintains posture and balance

• **Pons:** Regulates respiration

• **Medulla:** Controls involuntary actions like blood pressure, salivation, vomiting, heartbeat, and breathing

PROTECTION:

The brain is protected by the skull (bony box) and is contained in a fluid-filled balloon for shock absorption.

[Students should draw a labeled diagram showing: Cerebrum, Cerebellum, Medulla, Pons, Hypothalamus, Pituitary gland, Spinal cord, with clear labels indicating Fore-brain, Mid-brain, and Hind-brain regions]

SECTION E - Answers to Case Study Based Questions

Ans 19.

(a) Insulin is produced by the pancreas (specifically by beta cells in the islets of Langerhans).

(b) The primary function of insulin is to regulate blood sugar (glucose) levels by promoting the uptake of glucose from blood into cells, where it can be used for energy or stored as glycogen.

(c) Feedback Mechanism in Normal Person:

When blood sugar levels rise after eating, specialized cells in the pancreas detect this increase. In response, they secrete more insulin into the bloodstream. Insulin helps cells absorb glucose from the blood, which lowers the blood sugar level back to normal. As blood sugar levels decrease to normal range, the pancreas reduces insulin secretion. This negative feedback loop maintains blood sugar homeostasis.

Ans 20.

(a) Phototropism - the directional growth movement in response to light stimulus.

(b) Auxin is the hormone responsible for this phototropic response.

(c) Different Responses of Shoots and Roots:

Shoots and roots respond differently to light due to their different growth requirements and the differential distribution of auxin:

• **Shoots:** Show positive phototropism (grow toward light). Auxin accumulates on the shady side, stimulating cell elongation there, causing bending toward light. This helps maximize photosynthesis.

• **Roots:** Show negative phototropism (grow away from light). Although the same auxin distribution occurs, root cells respond differently - high auxin concentration inhibits growth in roots. This causes roots to bend away from light and grow downward into soil where water and nutrients are available.