

PRACTICE PAPER 01 (2026-27)
CHAPTER 06: CONTROL AND COORDINATION
(STEP-BY-STEP SOLUTIONS)

SUBJECT: SCIENCE

MAX. MARKS : 40

CLASS : X

DURATION : 1½ hrs

General Instructions:

- (i) All questions are compulsory.
- (ii) This question paper contains **20** questions divided into five Sections A, B, C, D and E.
- (iii) **Section A** comprises 10 MCQs and Assertion-Reason questions of **1 mark** each. **Section B** comprises 4 Very Short Answer questions of **2 marks** each. **Section C** comprises 3 Short Answer questions of **3 marks** each. **Section D** comprises 1 Long Answer question of **5 marks**. **Section E** comprises 2 Case Study Based questions of **4 marks** each.
- (iv) There is no overall choice. Internal choice is provided in Section E.
- (v) Use of calculators is not permitted.

SECTION - A

Questions 1 to 10 carry 1 mark each.

1. In a neuron, information from the environment is first acquired at the

- | | |
|---------------|---------------------|
| (a) axon | (b) dendritic tip |
| (c) cell body | (d) end of the axon |

Solution:

Ans: (b) dendritic tip

- The impulse then travels dendrite → cell body → axon; at the axon end it is converted into a chemical signal.

2. Involuntary actions such as blood pressure, salivation and vomiting are controlled by the

- | | |
|----------------|-------------------------------|
| (a) cerebellum | (b) medulla in the hind-brain |
| (c) fore-brain | (d) spinal cord |

Solution:

Ans: (b) medulla in the hind-brain

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

- | | |
|--------------------|-----------------|
| (a) Auxin | (b) Gibberellin |
| (c) Absciscic acid | (d) Cytokinin |

Solution:

Ans: (c) Absciscic acid

- Auxin, gibberellins and cytokinins promote growth; absciscic acid is a growth inhibitor.

4. The growth of a pollen tube towards the ovule is an example of

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

Solution:

Ans: (d) chemotropism

- Directional growth in response to a chemical stimulus.

5. Deficiency of growth hormone in childhood leads to

- | | |
|--------------|------------------|
| (a) goitre | (b) diabetes |
| (c) dwarfism | (d) swollen neck |

Solution:

Ans: (c) dwarfism

- Growth hormone, secreted by the pituitary, regulates growth and development of the body.

6. When the leaves of a sensitive plant (chhui-mui) are touched, they fold up because the plant cells

- (a) contract using special proteins
- (b) change shape by changing the amount of water in them
- (c) grow faster on one side
- (d) receive impulses through nervous tissue

Solution:

Ans: (b) change shape by changing the amount of water in them

- Plants have no nervous or muscle tissue; cells swell or shrink as water moves, changing shape. No growth is involved.

7. A squirrel facing danger prepares to fight or run away. The hormone responsible and the gland secreting it are

- | | |
|------------------------|--------------------------------|
| (a) thyroxin - thyroid | (b) adrenaline - adrenal gland |
| (c) insulin - pancreas | (d) growth hormone - pituitary |

Solution:

Ans: (b) adrenaline - adrenal gland

8. Which one of the following pairs of hormone and endocrine gland is correctly matched?

- | | |
|---------------------------|-------------------------|
| (a) Thyroxin - Pancreas | (b) Insulin - Pituitary |
| (c) Testosterone - Testes | (d) Oestrogen - Thyroid |

Solution:

Ans: (c) Testosterone - Testes

- Thyroxin - thyroid; insulin - pancreas; oestrogen - ovaries.

In the following questions 9 and 10, a statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as:

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
- (c) (A) is true but (R) is false.
- (d) (A) is false but (R) is true.

9. **Assertion (A):** Reflex arcs are formed in the spinal cord.

Reason (R): Nerves from all over the body meet in a bundle in the spinal cord on their way to the brain.

Solution:

Ans: (a)

- The best place to connect input and output nerves is where they first meet - the spinal cord. R explains A.

10. Assertion (A): Electrical impulses can reach each and every cell of the animal body.

Reason (R): Once a cell generates and transmits an electrical impulse, it takes some time to reset before it can transmit a new one.

Solution:

Ans: (d)

- (A) is false: impulses reach only cells connected by nervous tissue. (R) is a true limitation of electrical impulses.

SECTION - B

Questions 11 to 14 carry 2 marks each.

11. (a) Trace the path of a nerve impulse through a neuron.

(b) What is a synapse? How is the impulse passed on across it?

Solution:

(a) Dendritic tip (information acquired; a chemical reaction creates an electrical impulse) → **cell body** → along the **axon** to its end. [1]

(b) The gap between two neurons is a **synapse**. At the axon end the electrical impulse causes release of **chemicals**, which cross the gap and start a similar electrical impulse in a dendrite of the next neuron. [$\frac{1}{2}$ + $\frac{1}{2}$]

12. Sugar tastes less sweet when you eat it with your nose blocked.

(a) Name the receptors that detect taste and smell, and the sense organs where they are located.

(b) Suggest why food seems less tasty when we have a cold.

Solution:

(a) Taste - **gustatory receptors** on the **tongue**; smell - **olfactory receptors** in the **nose**. [$\frac{1}{2}$ + $\frac{1}{2}$]

(b) Our full sense of flavour uses inputs from both taste and smell receptors. In a cold, the blocked nose stops the olfactory receptors from detecting smell, so food seems less tasty. [1]

13. The brain and spinal cord are delicate organs. How does the body protect (a) the brain and

(b) the spinal cord?

Solution:

(a) The brain sits inside a **bony box (skull)**; inside it, the brain is contained in a **fluid-filled balloon** that gives further **shock absorption**. [1]

(b) The spinal cord is protected by the **vertebral column (backbone)**. [1]

14. Compare the way movement takes place in the leaves of a sensitive plant with the movement in our legs.

Solution:

Sensitive plant: no nervous or muscle tissue; information is passed cell to cell by electrical-chemical means; cells change shape by **changing the amount of water** in them (swelling/shrinking). [1]

Our legs: nerve impulses travel through nervous tissue to muscles; muscle cells have **special proteins** that change shape and arrangement, so muscle fibres shorten. [1]

SECTION - C

Questions 15 to 17 carry 3 marks each.

15. (a) Why is the fore-brain called the main thinking part of the brain?
(b) After a head injury, a man can think clearly but cannot walk in a straight line or pick up a pencil properly. Which part of his brain is likely damaged? Justify.
(c) Which part of the brain controls our feeling of having eaten enough?

Solution:

(a) It has areas that **receive sensory impulses** (hearing, smell, sight), **association areas** that interpret this with stored information, and **motor areas** that control voluntary muscles – so it decides how to respond. [1]

(b) The **cerebellum** (in the hind-brain): it is responsible for **precision of voluntary actions** and maintaining **posture and balance**. [1]

(c) A **centre associated with hunger** in a separate part of the **fore-brain**. [1]

16. (a) Plants show two types of movement. Name them and give one example of each.
(b) How do the root and the shoot respond to gravity? Name this response.
(c) Design a simple experiment to show hydrotropism.

Solution:

(a) (i) Movement **independent of growth** – folding of leaves of the sensitive plant on touch.

(ii) Movement **dependent on growth** – bending of a shoot towards light / tendrils coiling around a support. [$\frac{1}{2}$ + $\frac{1}{2}$]

(b) Roots grow **downwards** (towards gravity) and shoots grow **upwards** (away from it). This is **geotropism**. [1]

(c) Sow a germinating seed in a box of **dry soil**; bury a small **porous pot filled with water** on one side. After a few days, dig out gently: the roots have grown **towards the water**, showing hydrotropism. [1]

17. (a) Why is it advised to use iodised salt? Name the disease caused by its deficiency and one symptom.
(b) Which gland produces insulin and what is its function? Why are some diabetic patients given insulin injections?

Solution:

(a) Iodine is necessary for the **thyroid gland** to make **thyroxin**, which regulates carbohydrate, protein and fat metabolism for balanced growth. [1] Deficiency → **goitre**; symptom: **swollen neck**. [$\frac{1}{2}$]

(b) **Pancreas**; insulin **regulates blood sugar level**. [$\frac{1}{2}$ + $\frac{1}{2}$] In diabetes, insulin is not secreted in proper amounts, so blood sugar rises and causes harm; injections supply the missing insulin. [$\frac{1}{2}$]

SECTION - D

Question 18 carries 5 marks.

- 18.** (a) State two limitations of using electrical impulses for communication in the body.
(b) How does chemical communication overcome these limitations?
(c) How does adrenaline prepare the body to deal with an emergency? Mention three changes it brings about.
(d) How is the timing and amount of hormone released regulated? Explain with an example.

Solution:

(a) (i) Impulses reach **only cells connected by nervous tissue**, not every cell. (ii) After transmitting an impulse, a cell needs **time to reset**, so it cannot create and transmit impulses continually. [$\frac{1}{2} + \frac{1}{2}$]

(b) Stimulated cells release a **chemical (hormone)** that diffuses around; other cells detect it with special molecules on their surfaces. It is slower, but it can **reach all cells** regardless of nervous connections and can be done **steadily and persistently**. [1]

(c) Adrenaline from the adrenal glands is secreted **directly into the blood** and carried to target organs. [$\frac{1}{2}$] Changes:

- **Heart beats faster** – more oxygen supplied to muscles.
- Blood to the **digestive system and skin is reduced** (muscles around small arteries contract) – blood is diverted to **skeletal muscles**.
- **Breathing rate increases** due to contraction of the diaphragm and rib muscles. [$\frac{1}{2} \times 3 = 1\frac{1}{2}$]

(d) By **feedback mechanisms**. Example: when blood sugar rises, the pancreas cells detect it and produce **more insulin**; as blood sugar falls, insulin secretion is **reduced**. [1]

SECTION - E (Case Study Based Questions)

Questions 19 and 20 carry 4 marks each.

19. Riya accidentally touched a hot vessel and pulled her hand away immediately, even before she felt the pain. The flow chart shows the sequence of events. Study it and answer the questions.

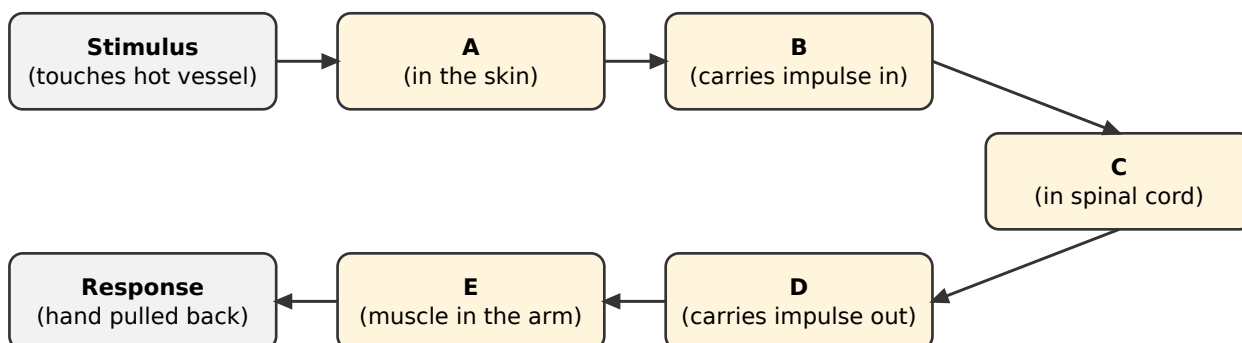


Figure: Sequence of events in a reflex action

- (a) Identify A and E. (1)
(b) Name B, C and D. (1)
(c) What is this pathway called? Why is this response faster than one in which the brain first thinks about the sensation? Does the information reach the brain at all? (2)

OR

- (c) How is a reflex action different from walking? Give one example of an involuntary action and name the part of the brain controlling it. (2)

Solution:

(a) A = **receptor** (heat/pain receptor in the skin); E = **effector** (muscle in the arm). [$\frac{1}{2} + \frac{1}{2}$]

(b) B = **sensory neuron**; C = **relay neuron** in the spinal cord; D = **motor neuron**. [1]

(c) This pathway is a **reflex arc**. [$\frac{1}{2}$] The input nerve is connected to the output nerve directly in the **spinal cord**, so the response does not wait for the complex thinking process in the brain, which is not fast enough. [1] **Yes** - the information also goes on to reach the brain. [$\frac{1}{2}$]

OR

(c) A reflex action is a quick, automatic response **without conscious thinking**, made through the spinal cord. Walking is a **voluntary action**, decided and controlled by the brain. [1]

Involuntary action example: heartbeat / salivation / vomiting / blood pressure - controlled by the **medulla** of the hind-brain. [$\frac{1}{2} + \frac{1}{2}$]

20. A student read about four plant hormones P, Q, R and S and recorded her notes in the table below.

Hormone	Observation recorded by the student
P	Made at the shoot tip; helps cells grow longer; moves to the shady side of the shoot
Q	Like P, helps in the growth of the stem
R	Promotes cell division; found in large amounts in fruits and seeds
S	Inhibits growth; its effects include wilting of leaves

- (a) Identify hormones P and S. **(1)**
 (b) Identify Q and R. Why is R present in greater concentration in fruits and seeds? **(1)**
 (c) Using hormone P, explain why a shoot kept near a window bends towards the light. **(2)**

OR

- (c) What are plant hormones? How do they reach their area of action? Why do plants need hormones like S as well as P, Q and R? **(2)**

Solution:

(a) P = **auxin**; S = **abscisic acid**. [$\frac{1}{2}$ + $\frac{1}{2}$]

(b) Q = **gibberellin**; R = **cytokinin**. Cytokinins promote cell division, so they are found in **areas of rapid cell division** such as fruits and seeds. [$\frac{1}{2}$ + $\frac{1}{2}$]

(c) Step 1: Auxin is synthesised at the **shoot tip** when the plant detects light. Step 2: With light coming from one side, auxin **diffuses towards the shady side**. [1]

Step 3: The higher auxin concentration makes cells on the shady side **grow longer**. Step 4: The shoot therefore **bends towards light** (positive phototropism). [1]

OR

(c) Plant hormones are chemicals that help coordinate **growth, development and responses to the environment**. [$\frac{1}{2}$] They are made at places **away from where they act** and simply **diffuse** to the area of action. [$\frac{1}{2}$]

Plants need signals to **promote** growth (P, Q, R) and also signals to **stop growing** - abscisic acid (S) inhibits growth, so growth stays controlled. [1]