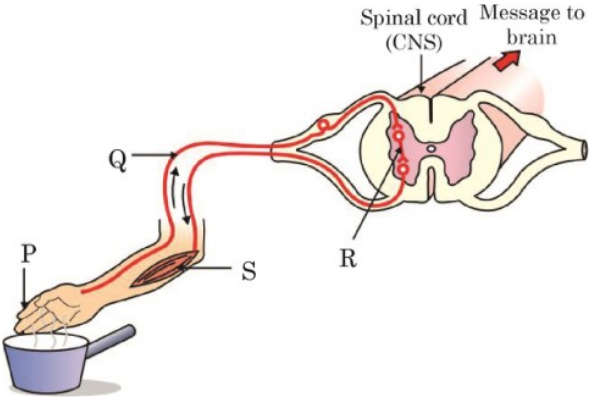
6. Control and Coordination - Board Exam Questions

2 Mark Questions

1) *Observe the given figure and identify the labelled parts P, Q, R and S.*

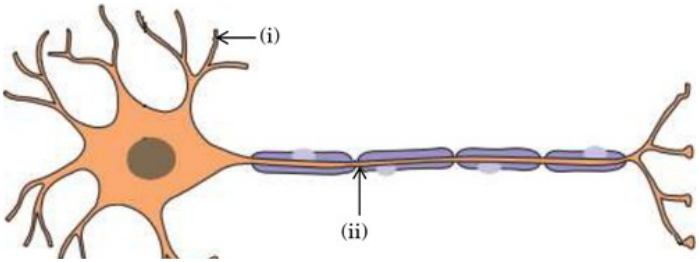


P: Receptor Q: Sensory neuron
R: Relay neuron S: Effector

2) *How is the mode of action in beating of the heart different from reflex actions? Give four examples.*

Beating of heart	Reflex action
It is an involuntary action. It is not under our control.	It is a sudden action in response to something.
It does not need any stimulus.	It needs a stimulus.
It is controlled by the brain.	It is controlled by the spinal cord.
It does not use skeletal muscles.	It uses skeletal muscles.

3) *Write the name and function of parts (i) and (ii) in the diagram of a neuron given below.*



(i) Dendrite: It receives the information.
(ii) Axon: The information travels through it as an electrical impulse.

4) *What happens at synapse between two neurons? State briefly.*

At the synapse, the electrical signal changes into chemicals. The chemicals cross the small gap and reach the next neuron. There they change back into an electrical signal.

In this way, the impulse passes from one neuron to the next.

5) *State two differences between the act of chewing food and salivation on sight of food.*

Chewing food	Salivation on sight of food
It is a voluntary action.	It is a reflex action.
It is controlled by the forebrain.	It is controlled by the medulla in the hind brain.

6) *Which parts of the brain perform certain actions for which we do not have any thinking control? What are such actions called, give two examples.*

The mid-brain and the hind-brain.
They are called involuntary actions.
Examples: blood pressure, salivation

7) *Name the parts of hind-brain of the human brain. Which part of the hind-brain controls involuntary actions such as blood pressure and salivation?*

Parts: Pons, Medulla and Cerebellum

Medulla controls blood pressure and salivation.

8) *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*

(i) Cerebellum (ii) Medulla (iii) Cerebrum (iv) Medulla

9) *(a) How is brain protected in our body? (b) A doctor finds in one of his patients that he is not maintaining a proper posture and balance of his body. State the region of brain and also the part of brain which is responsible for it.*

(a) The brain is kept inside a bony box (the skull).

(b) Region: Hind brain. Part: Cerebellum.

10) *How is the movement of leaves of a sensitive plant different from the downward movement of the roots?*

Leaves of sensitive plant	Downward movement of roots
The stimulus is touch.	The stimulus is gravity.
No growth is involved.	Growth is involved.

11) *List two differences between the movement of leaves of a sensitive plant and the movement of a shoot towards light.*

Leaves of sensitive plant	Shoot towards light
It is not related to growth.	It happens because the stem grows.
It is fast.	It is slow.

12) *Where are auxins synthesized? How do they promote phototropism?*

Auxins are made at the tip of the shoot.

When light falls on one side of the plant, auxin moves to the shady side of the shoot.

There it makes the cells grow longer. So the shoot bends towards the light.

13) *Where are auxins synthesized in a plant? Which organ of the plant shows: (i) Positive phototropism (ii) Negative geotropism (iii) Positive hydrotropism*

At the tip of the shoot.

(i) Shoot (ii) Shoot (iii) Root

14) *Which of the plant hormones are responsible for the following processes? (i) Promote cell division (ii) Inhibition of growth (iii) Detection of light (iv) Wilting of leaves*

(i) Cytokinin (ii) Abscisic acid (iii) Auxin (iv) Abscisic acid

15) *(a) Write the role of insulin in regulating blood sugar levels in human body. Mention the disease caused due to it. (b) How is the timing and the amount of release of insulin in the blood regulated?*

(a) Insulin lowers the sugar level in the blood. Too little insulin causes diabetes.

(b) When blood sugar rises, more insulin is made. When blood sugar falls, less insulin is made.

16) *Varun is diabetic. His latest ultrasound reports showed a blockage in his pancreatic duct. How will this affect the dual functioning of the pancreas?*

• The digestive enzymes from the pancreas cannot reach the small intestine, so digestion is affected.

• His insulin secretion is already affected (he is diabetic).

17) *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?*

Hormone: Thyroxine. Gland: Thyroid gland.

The thyroid gland needs iodine to make thyroxine. Lack of iodine causes goitre (swollen neck).

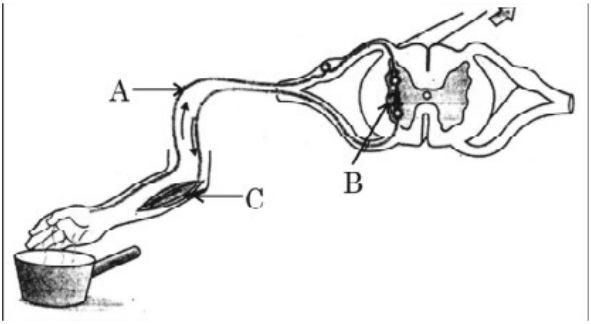
3 Mark Questions

1) *Define reflex action. With the help of a flow chart show the path of a reflex action such as sneezing.*

A reflex action is a sudden, automatic action in response to a stimulus. It does not involve thinking. Example: sneezing.

Stimulus → Receptors (nose) → Sensory neuron → Spinal cord (relay neuron) → Motor neuron → Effector (muscles) → Response

2) *In the given diagram (i) Name the parts labelled A, B, and C. (ii) Write the functions of A and C. (iii) Reflex arcs have evolved in animals? Why?*



(i) A: Sensory neuron B: Relay neuron C: Effector organ

(ii) A carries the message from the receptor to the spinal cord.

C responds to the stimulus.

(iii) Thinking in the brain is not fast enough. Reflex arcs give a quick response.

3) *Draw and explain how the nerve cells help in transmission of impulses?*

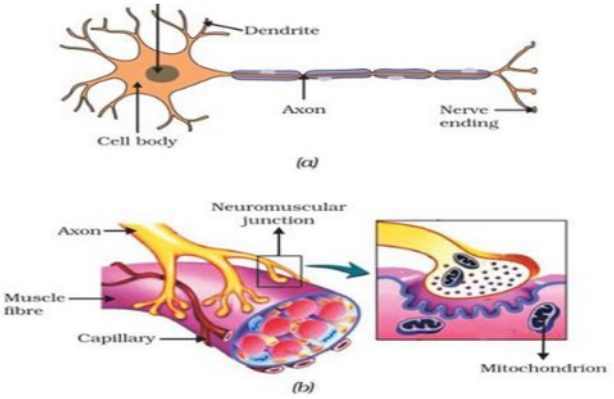


Figure (a) Structure of neuron. (b) Neuromuscular junction

• The tips of the dendrites pick up information. This starts a chemical reaction that makes an electrical impulse.
• The impulse travels from the dendrite to the cell body, and then along the axon to its end.
• At the end of the axon, the impulse releases some chemicals.
• These chemicals cross the gap (synapse) and start a new impulse in the dendrite of the next neuron. This is how impulses travel in the body.

4) *How do muscles move at the cellular level and respond when processed messages are received from the brain?*

When a nerve impulse reaches a muscle, the muscle cells change their shape and become shorter.

Muscle cells have special proteins. These proteins change their shape and arrangement when the impulse arrives.

The new arrangement makes the muscle cells shorter, and the muscle moves.

5) *(a) List two constituents of Central Nervous System (CNS). How are these components protected from injuries? (b) Write two limitations of the use of electrical impulses.*

(a) Brain and spinal cord.

The brain is kept in a bony box (skull). The spinal cord is protected by the backbone (vertebral column).

(b) (i) They reach only the cells that are joined to nerve tissue, not every cell in the body.

(ii) After a cell sends an impulse, it needs some time to reset before it can send a new one.

6) *State two limitations of electrical impulses in multicellular organisms. Why is chemical communication better than electrical impulses as a means of communication between cells in multicellular organisms?*

Limitations:

• They reach only the cells that are joined to nerve tissue, not every cell in the body.

• After a cell sends an impulse, it needs some time to reset before it can send a new one.

Chemical communication is better because the chemicals (hormones) can reach all the cells of the body, steadily and for a long time.

7) *Give differences between the following: (a) Nephron and neuron (b) Sensory nerve and motor nerve (c) Consumers and decomposers*

(a) Nephron is the basic unit of the kidney. Neuron is the basic unit of the nervous system.

(b) A sensory nerve carries messages from the receptors to the brain and spinal cord. A motor nerve carries messages from the brain and spinal cord to the muscles (effectors).

(c) Consumers eat producers or other consumers. Decomposers break down dead plants and animals into simple substances.

8) *Plants have neither a nervous system nor muscles, even then they respond to stimuli. For example, the leaves of chhui-mui (touch-me-not) plant when touched begin to fold up and droop. (a) How is the information communicated in "touch-me-not" plants? (b) What enables the plant cells*

to bring out the observable response? (c) Differentiate the movement mentioned above from the movement of tendrils in a pea plant.

(a) The plant cells pass the information from cell to cell by electrical-chemical means.

(b) The plant cells change their shape by changing the amount of water in them. They swell or shrink, and the leaves fold.

(c) The movement in touch-me-not does not need growth. The movement of tendrils in a pea plant happens by growth.

9) *(a) Define hormone. (b) "Hormones should be secreted in precise quantities. We have a feedback mechanism through which this is done." With the help of an example justify the statement.*

(a) Hormones are chemical messengers that control the work of the body.

(b) The amount of hormone is controlled by feedback. Example:

When the sugar level in the blood rises, the cells of the pancreas sense it and make more insulin. The insulin lowers the blood sugar.

When the sugar level falls, the pancreas senses it and makes less insulin.

10) *Taking the example of any two animal hormones along with their gland of secretion, explain how these hormones help (i) in growth and development and (ii) regulate metabolism, in the body.*

(i) Growth hormone is made by the pituitary gland. It helps all the organs of the body to grow.

(ii) Thyroxine is made by the thyroid gland. It controls the use of carbohydrates, proteins and fats in the body.

11) *We are advised to take iodised salt in our diet by doctors. Justify it's importance in our body.*

• Iodine is needed to make the hormone thyroxine.

• Thyroxine controls the use of carbohydrates, proteins and fats in the body.

• Thyroxine keeps the growth of the body in balance.

12) *Name the hormone released and the gland which secretes it in human beings during scary situations. How does the body respond to enable it to deal with the situation?*

Hormone: Adrenaline. Gland: Adrenal gland.

• The heart beats faster, so more oxygen reaches the muscles.
• We breathe faster.

13) *Give reasons for the following: (a) Adrenal gland is known as the stress gland of the body. (b) Prenatal sex determination is banned in India. (c) Vegetative propagation is advantageous in some plants.*

(a) The adrenal gland makes adrenaline, which helps the body to face a scary situation.
(b) To stop female foeticide (killing of girl babies before birth).
(c) Plants grown this way bear flowers and fruits earlier than plants grown from seeds.

4 Mark Questions (Case Study)

1) *In life there are certain changes in the environment called 'stimuli' to which we respond appropriately. Touching a flame suddenly is a dangerous situation for us. One way is to think consciously about the possibility of burning and then moving the hand. But our body has been designed in such a way that we save ourself from such situations immediately.*

(i) Name the action by which we protect ourself in the situation mentioned above and define it. (1)

(refer 1st 3 mark question)

(ii) Write the role of (a) motor and (b) relay neuron. (1)

(a) Motor neuron: carries the message from the spinal cord to the muscle (effector).
(b) Relay neuron: joins the sensory neuron to the motor neuron.

(iii) (A) What are the two types of nervous system in human body? Name the components of each of them. (2)

Central nervous system: brain and spinal cord.

Peripheral nervous system: cranial nerves and spinal nerves.

OR (iii) (B) Which part of the human brain is responsible for: (a) thinking (b) picking up a pencil (c) controlling blood pressure (d) controlling hunger

(a) Cerebrum (forebrain) (b) Cerebellum (c) Medulla (d) Forebrain

2) *A middle-aged person is facing some cognitive changes in himself. His early symptoms included mild forgetfulness. For example, forgetting where he left his mobile or failing to find words to complete his sentences. He was facing problems in driving a car, climbing up and down the stairs, inserting a plug into an outlet. He slowly developed a sad mood and anxiety.*

(a) What are voluntary actions? (1)

Actions that are under our control and done by our will. They are controlled by the forebrain.

(b) Which part of the brain is responsible for precision of voluntary actions? (1)

Cerebellum

(c) (i) Explain the role of the medulla. (2)

The medulla controls involuntary actions like the heart beat and blood pressure.

OR (c) (ii) How do the animal muscles move?

(refer 4th 3 mark question)

3) *A person while climbing up a rocky hill comes into a panic state and fear. His body starts reacting in a "flight-or-flight" condition to adjust to the dangerous and stressful situation.*

(a) (i) Name the hormone secreted in the blood of the person in this situation. (2)

Adrenaline

OR (a) (ii) Name the source gland of the hormone secreted in this condition.

Adrenal gland

(b) State any two responses in the body of the person as a result of the secretion of this hormone. (1)

(refer 12th 3 mark question)

(c) How does the action of the chemical signal in terms of hormones differ from the electrical impulses via nerve cells? (1)

A hormone travels in the blood and reaches many cells all over the body. An electrical impulse travels only through nerve cells.

4) *Plants exhibit movements in response to various environmental stimuli to adopt and survive in their surroundings. These movements, influenced by external factors such as light, gravity, water and chemicals are regulated by specific plant hormones. For example, the differential growth of plant parts allows them to bend, grow or orient themselves in particular directions. Roots and shoots often show contrasting response to the same stimulus, highlighting the complex mechanisms involved in plant growth and development.*

(a) Why is hydrotropism essential for plants? (1)

Because of hydrotropism, roots grow towards water. So they can take in water and minerals.

(b) What role does auxin play in the growth of plants? (1)

Auxin makes the cells grow longer.

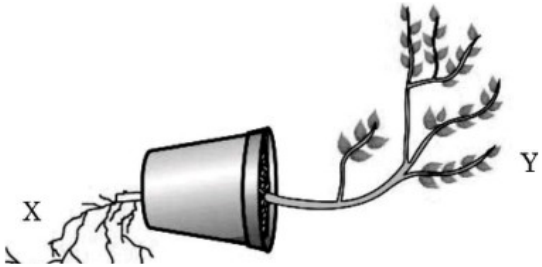
(c) Differentiate between movement shown by the sensitive plant and tropic movement by plants (Two points). (2)

Sensitive plant	Tropic movement
Not directional	Directional
Fast	Slow

OR (c) How does movement of roots differ from that of shoots in response to gravity and light?

	Roots	Shoots
Gravity	Grow towards gravity (positive geotropism)	Grow away from gravity (negative geotropism)
Light	Grow away from light (negative phototropism)	Grow towards light (positive phototropism)

5) *The growth movements of plant parts in which the direction of the stimulus determines the direction of the response is known as tropic movements or tropism. Plants also have non-directional movements which may not be growth dependent.*



(I) Name the movement which causes 'X' and 'Y' to grow downwards and upwards respectively. (Refer above figure) (1)

X: positive geotropism Y: negative geotropism

(II) Write the name of a hormone that plays a major role in (i) falling of leaves (ii) rapid cell division (1)

(i) Abscisic acid (ii) Cytokinin

(III) (a) Leaves of the sensitive plant move very quickly in response to 'touch'. How is this stimulus of touch communicated and explain how the movement takes place. (2)

(refer 8th 3 mark question)

OR (III) (b) Name the plant hormone which is synthesized at the shoot tip. How does this hormone helps the plant to bend towards light?

(refer 12th 2 mark question)

6) *Mohan and Rohit observed that shoots of a plant growing in shade bend towards the sunlight. Whereas, leaves of 'Touch me not' plant fold and droop soon after touching. They were curious to know how these movements occur in plants.*
Attempt either subpart A or B.



A. Shoots of a plant bending towards light



B. Folding of leaves Touch me not plant

A. What causes the bending of shoots in the plants as shown in figure A? (2)
(refer 12th 2 mark question)
OR B. What causes the folding of the leaves in 'Touch me not' plant as shown in figure B?
(refer 8th 3 mark question)
C. Compare the movement of growth of the pollen tube towards ovule with the movements shown in part A of the above figure. (1)

The pollen tube grows towards the ovule because of chemicals (chemotropism). The shoot bends towards sunlight (phototropism).
D. Compare the movement shown in figure B with the movement of body parts in the animals. (1)

Both pass information by electrical-chemical means. But plants have no special tissue (like nerves) to carry it.

Animal muscle cells change shape using special proteins. Plant cells change shape by changing the amount of water in them.

5 Mark Questions

1) *(a) Differentiate between voluntary and involuntary action.*
(b) Define reflex action. With the help of a flow diagram, show the correct sequence of path of Nerve impulse from place of its origin.
(a)

Voluntary action	Involuntary action
Thinking is involved.	No thinking is involved.
Controlled by the forebrain.	Controlled by the hindbrain.

(b) (refer 1st 3 mark question)

2) *(i) Define a reflex arc. Why have reflex arcs evolved in animals? Trace the sequence of events which occur, when you suddenly touch a hot object.*
(ii) Name the part of nervous system which helps in communication between the central nervous system and other parts of the body. What are the two components of this system?
(i) The path along which the impulse travels in a reflex action is called a reflex arc.

Reflex arcs evolved because thinking in the brain is not fast enough.

Hot object (stimulus) → Receptors (skin) → Sensory neurons → Spinal cord → Motor neurons → Effectors (muscles) → Response
(ii) Peripheral nervous system.

Its parts: cranial nerves and spinal nerves.

3) *(i) Distinguish between hormonal co-ordination in plants and animals.*
(ii) Which part of the brain is responsible for – (1) intelligence (2) riding a bicycle (3) vomiting (4) controlling hunger
(iii) How is brain and spinal-cord protected against mechanical injuries?
(i)

In plants	In animals
Hormones move by simple diffusion.	Hormones are carried by blood to the target organ.
No special glands.	Hormones are made by endocrine glands.

(ii) (1) Cerebrum (2) Cerebellum (3) Medulla (4) Hypothalamus
(iii) (refer 5th 3 mark question)

4) *(i) List three points of difference between nervous and hormonal mechanisms for control and coordination in animals.*
(ii) How are auxins related with the bending of plant shoot towards unidirectional light? Explain.
(i)

Nervous control	Hormonal control
Messages are electrical impulses.	Messages are chemicals (hormones).
Carried by neurons.	Carried by blood.
Quick response.	Slow response.

(ii) (refer 12th 2 mark question)

5) *(i) What are tropic movements? Give an example of a plant hormone which (1) inhibits growth and (2) promotes cell division.*

(ii) Explain directional movement of a tendril in pea plant in response to touch. Name the hormone responsible for this movement.

(i) Growth movements of a plant in response to a stimulus coming from a particular direction.

(1) Abscisic acid (2) Cytokinins

(ii) When a tendril touches a support, auxin moves away from the point of contact. The side away from the support grows more. The two sides grow unequally, so the tendril coils around the support.

Hormone: Auxin

6) *(i) Leaves of 'chhui-mui' plant begin to fold up and droop in response to a stimulus. Name the stimulus and write the cause for such a rapid movement. Is there any growth involved in the movement?*

(ii) Define geotropism in plants. What is meant by positive and negative geotropism? Give one example of each type.

(i) (refer 8th 3 mark question)

(ii) The growth of a plant part in response to gravity is called geotropism.

Positive geotropism: growth towards gravity. Example: roots grow downwards.

Negative geotropism: growth away from gravity. Example: shoots grow upwards.

7) *(a) Analyse the given situations and interpret the possible reason for each: (i) Iodine deficiency in diet increases the possibility of a disease of swollen neck in a person. (ii) Some people in population may have very short heights (dwarfs). (iii) Thick facial hairs develop in boys at the age of 10-12 years.*

(b) Explain two reasons which necessitate the need of chemical communication in multicellular organisms.

(a) (i) (refer 11th 3 mark question)

(ii) Too little growth hormone in childhood causes dwarfism.

(iii) The hormone testosterone is made in boys at puberty.

(b) Hormones can reach all the cells of the body, steadily and for a long time.

Hormones help to control growth, development and responses to the surroundings.

8) *(i) Name the disorder which a person is likely to suffer from due to the following: (I) Over-secretion of growth hormone (II) Deficiency of oestrogen in females (III) Less secretion of thyroxine. Also name the gland that secretes each of the hormones mentioned above.*
(ii) How is the timing and amount of hormone released regulated? Explain with the help of an example.

(i)

	Disorder	Gland
(I)	Gigantism	Pituitary
(II)	Delay in puberty	Ovary
(III)	Goitre	Thyroid

(ii) (refer 9th 3 mark question)

9) *a) A doctor has advised Sameer to reduce sugar intake in his diet and do regular exercise after checking his blood test reports. Which disease do you think Sameer is suffering from? Name the hormone responsible for this disease and the organ producing the hormone.*
b) Which hormone is present in the areas of rapid cell division in a plant and which hormone inhibits the growth?

a) Disease: Diabetes. Hormone: Insulin. Organ: Pancreas.

b) (refer 14th 2 mark question)