

CBSE Class 10 Science
NCERT Exemplar Solution
Chapter 7
Control and Coordination

Exercise

Multiple Choice Questions (MCQs)

1. Which of the following statements is correct about receptors?

- (a) Gustatory receptors detect taste while olfactory receptors detect smell
- (b) Both gustatory and olfactory receptors detect smell
- (c) Auditory receptors detect smell and olfactory receptors detect taste
- (d) Olfactory receptors detect taste and gustatory receptors smell

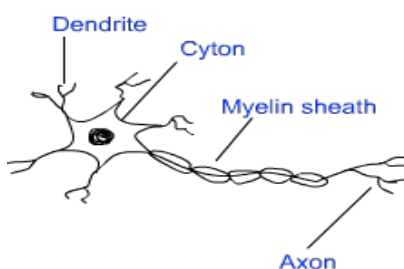
Ans. (a) Gustatory receptors detect taste while olfactory receptors detect smell

2. Electrical impulse travels in a neuron from

- (a) Dendrite → axon → axonal end → cell body
- (b) Cell body → dendrite → axon → axonal end
- (c) Dendrite → cell body → axon → axonal end
- (d) Axonal end → axon → cell body → dendrite

Ans. (c) Dendrite → cell body → axon → axonal end

Explanation: Dendrites of a neuron receive electrical impulse from axonal end of another neuron. After that, electrical impulse travels through cell body, axon; to the axonal end.



3. In a synapse, chemical signal is transmitted from

- (a) dendritic end of one neuron to axonal end of another neuron
- (b) axon to cell body of the same neuron
- (c) cell body to axonal end of the same neuron
- (d) axonal end of one neuron to dendritic end of another neuron

Ans. (d) axonal end of one neuron to dendritic end of another neuron

Explanation: The electric impulses travel from the axon to the dendrite of another neuron through a synaptic gap which consists of SYNAPSE.

4. In a neuron, conversion of electrical signal to a chemical signal occurs at/in

- (a) cell body
- (b) axonal end
- (c) dendritic end
- (d) axon

Ans. (b) Axonal end

Explanation: At the axonal end, electrical impulse sets off the release of some chemicals; called neurotransmitters. These chemicals enter the dendrite of another neuron to transmit the signal.

5. Which is the correct sequence of the components of a reflex arc?

- (a) Receptors → Muscles → Sensory neuron → Motor neuron → Spinal cord
- (b) Receptors → Motor neuron → Spinal cord → Sensory neuron → Muscle
- (c) Receptors → Spinal cord → Sensory neuron → Motor neuron → Muscle

(d) Receptors →Sensory neuron →Spinal cord →Motor neuron →Muscle

Ans. (d) Receptors →Sensory neuron →Spinal cord →Motor neuron →Muscle

Explanation: In a reflex arc, sensory neurons pick signals from receptors. These signals are then sent to the spinal cord; from where they go to muscle via motor neuron.

6. Which of the following statements are true?

(i) Sudden action in response to something in the environment is called reflex action

(ii) Sensory neurons carry signals from spinal cord to muscles

(iii) Motor neurons carry signals from receptors to spinal cord

(iv) The path through which signals are transmitted from a receptor to a muscle or a gland is called reflex arc

(a) (i) and (ii)

(b) (i) and (iii)

(c) (i) and (iv)

(d) (i), (ii) and (iii)

Ans. (c) (i) and (iv)

Explanation: Sensory neurons carry signals from muscles to spinal cord, hence statements (ii) and (iii) are incorrect.

7. Which of the following statements are true about the brain?

(i) The main thinking part of brain is hind brain

(ii) Centres of hearing, smell, memory, sight etc are located in fore brain.

(iii) Involuntary actions like salivation, vomiting, blood pressure are controlled by the medulla in the hind brain

(iv) Cerebellum does not control posture and balance of the body

- (a) (i) and (ii)
- (b) (i), (ii) and (iii)
- (c) (ii) and (iii)
- (d) (iii) and (iv)

Ans. (c) (ii) and (iii)

Explanation: The main thinking part of the brain is forebrain and hence statement (i) is incorrect. Cerebellum controls posture and balance of the body and hence statement (iv) is incorrect.

8. Posture and balance of the body is controlled by

- (a) cerebrum
- (b) cerebellum
- (c) medulla
- (d) pons

Ans. (b) Cerebellum

Explanation: Cerebellum controls posture and balance of the body

9. Spinal cord originates from

- (a) cerebrum
- (b) medulla
- (c) pons
- (d) cerebellum

Ans. (b) medulla

10. The movement of shoot towards light is

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

Ans. (d) phototropism

Explanation: The term 'phototropism' is composed of two terms. 'Photo' means light and 'tropism' means growth.

11. The main function of abscisic acid in plants is to

- (a) increase the length of cells
- (b) promote cell division
- (c) inhibit growth
- (d) promote growth of stem

Ans. (c) Inhibit growth

12. Which of the following is not associated with growth of plant?

- (a) Auxin
- (b) Gibberellins
- (c) Cytokinins
- (d) Abscisic acid

Ans. (d) Abscisic acid

Explanation: It is an inhibitory hormone and hence is not associated with growth of plant.

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

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

Ans. (b) Thyroxin

Explanation: This is the reason, deficiency of iodine results in hypothyroidism.

14. Choose the incorrect statement about insulin

- (a) It is produced from pancreas
- (b) It regulates growth and development of the body
- (c) It regulates blood sugar level
- (d) Insufficient secretion of insulin will cause diabetes

Ans. (b) It regulates growth and development of the body

Explanation: Insulin has no role to play in growth and development of the body.

15. Select the mis-matched pair

- (a) Adrenaline: Pituitary gland
- (b) Testosterone: Testes
- (c) Estrogen: Ovary
- (d) Thyroxin: Thyroid gland

Ans. (a) Adrenaline: Pituitary gland

Explanation: Adrenaline is secreted by adrenal gland. And pituitary gland secretes GSH, TSH and FSH.

16. The shape of guard cells changes due to change in the

- (a) protein composition of cells
- (b) temperature of cells
- (c) amount of water in cells
- (d) position of nucleus in the cells

Ans. (c) Amount of water in cells

Explanation: Excess amount of water results in guard cells becoming turgid, while lack of water results in flaccidity of guard cells.

17. The growth of tendril in pea plants is due to

- (a) effect of light
- (b) effect of gravity
- (c) rapid cell divisions in tendrillar cells that are away from the support
- (d) rapid cell divisions in tendrillar cells in contact with the support

Ans. (c) rapid cell divisions in tendrillar cells that are away from the support

Explanation: Due to this, there is more growth on portion away from support. This results in tendrils getting twined around the support.

18. The growth of pollen tubes towards ovules is due to

- (a) hydrotropism

(b) chemotropism

(c) geotropism

(d) phototropism

Ans. (b) chemotropism

Explanation: Ovules release certain chemicals which stimulate the growth of pollen tubes towards ovules.

19. The movement of sunflower in accordance with the path of sun is due to

(a) phototropism

(b) geotropism

(c) chemotropism

(d) hydrotropism

Ans. (a) phototropism

Explanation: Phototropism is the response of the plants towards light. Thus, sunflower moves in accordance with the path of sun.

20. The substance that triggers the fall of mature leaves and fruits from plants is due to

(a) auxin

(b) gibberellin

(c) abscisic acid

(d) cytokinin

Ans. (c) abscisic acid

21. Which of the following statements about transmission of nerve impulse is

incorrect?

- (a) Nerve impulse travels from dendritic end towards axonal end
- (b) At the dendritic end electrical impulses bring about the release of some chemicals which generate an electrical impulse at the axonal end of another neuron
- (c) The chemicals released from the axonal end of one neuron cross the synapse and generate a similar electrical impulse in a dendrite of another neuron
- (d) A neuron transmits electrical impulses not only to another neuron but also to muscle and gland cells

Ans. (b) At the dendritic end electrical impulses bring about the releases of some chemicals which generate an electrical impulse at the axonal end of another neuron.

Explanation: Chemicals are released from the axonal end and not from dendritic end.

22. Involuntary actions in the body are controlled by

- (a) medulla in fore brain
- (b) medulla in mid brain
- (c) medulla in hind brain
- (d) medulla in spinal cord

Ans. (c) Medulla in hind brain

Explanation: Medulla is a part of hind brain.

23. Which of the following is not an involuntary action?

- (a) Vomiting
- (b) Salivation
- (c) Heart beat

(d) Chewing

Ans. (d) Chewing

24. When a person is suffering from severe cold, he or she cannot

(a) differentiate the taste of an apple from that of an ice cream

(b) differentiate the smell of a perfume from that of an agarbatti

(c) differentiate red light from green light

(d) differentiate a hot object from a cold object

Ans. (b) differentiate the smell of a perfume from that of an agarbatti

Explanation: When a person is suffering from severe cold, his olfactory receptors are blocked. Due to this, sense of smell is compromised.

25. What is the correct direction of flow of electrical impulses?

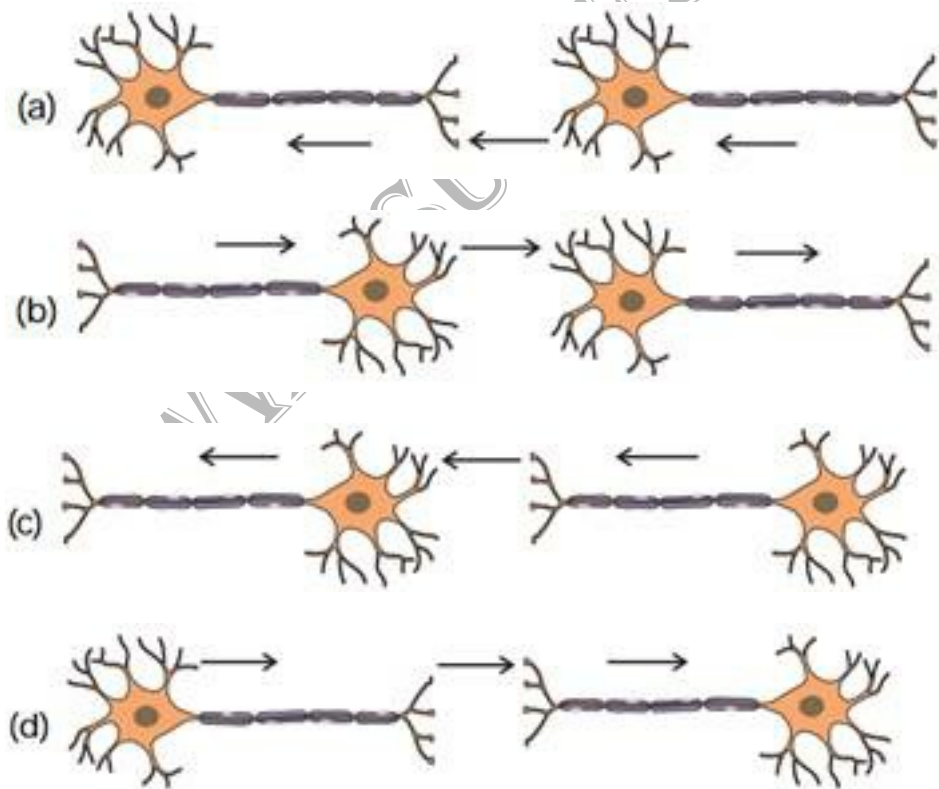


Fig. 7.1

Ans. (c)

Explanation: Dendrites of a neuron receive electrical impulse from axonal end of another neuron. After that, electrical impulse travels through cell body, axon; to the axonal end.

26. Which statement is not true about thyroxin?

- (a) Iron is essential for the synthesis of thyroxin
- (b) It regulates carbohydrates, protein and fat metabolism in the body
- (c) Thyroid gland requires iodine to synthesise thyroxin
- (d) Thyroxin is also called thyroid hormone

Ans. (a) Iron is essential for the synthesis of thyroxin

Explanation: It is iodine which is essential for the synthesis of thyroxin.

27. Dwarfism results due to

- (a) Excess secretion of thyroxin
- (b) Less secretion of growth hormone
- (c) Less secretion of adrenaline
- (d) Excess secretion of growth hormone

Ans. (b) Less secretion of growth hormone

Explanation: As the name suggests, growth hormone is responsible for proper growth in a person. Hence, lack of growth hormone would result in dwarfism.

28. Dramatic changes of body features associated with puberty are mainly because of secretion of

- (a) oestrogen from testes and testosterone from ovary

- (b) estrogen from adrenal gland and testosterone from pituitary gland
- (c) testosterone from testes and estrogen from ovary
- (d) testosterone from thyroid gland and estrogen from pituitary gland

Ans. (c) testosterone from testes and estrogen from ovary

Explanation: These are called sex hormones and are secreted from gonads. Testosterone is secreted in males and oestrogen is secreted in females.

29. A doctor advised a person to take an injection of insulin because

- (a) his blood pressure was low
- (b) his heart was beating slowly
- (c) he was suffering from goiter
- (d) his sugar level in blood was high

Ans. (d) his sugar level in blood was high

Explanation: if a person is suffering from diabetes then his blood sugar level may become high. This disease is managed in some patients by administering insulin injection.

30. The hormone which increases the fertility in males is called

- (a) oestrogen
- (b) testosterone
- (c) insulin
- (d) growth hormone

Ans. (b) Testosterone

31. Which of the following endocrine glands is unpaired?

- (a) Adrenal
- (b) Testes
- (c) Pituitary
- (d) Ovary

Ans. (c) Pituitary

32. Junction between two neurons is called

- (a) cell junction
- (b) neuro muscular junction
- (c) neural joint
- (d) synapse

Ans. (d) synapse

33. In humans, the life processes are controlled and regulated by

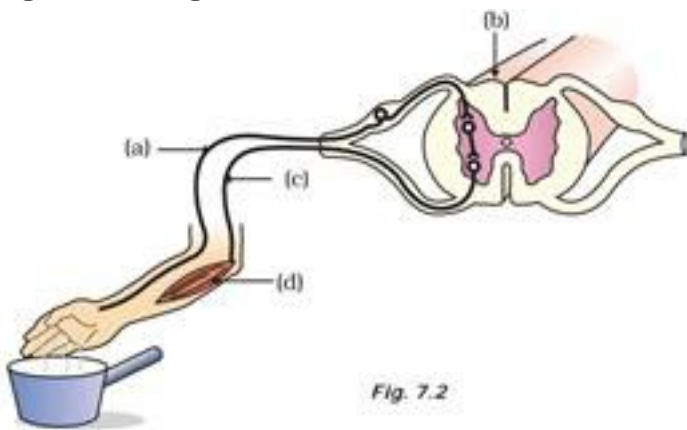
- (a) reproductive and endocrine systems
- (b) respiratory and nervous systems
- (c) endocrine and digestive systems
- (d) nervous and endocrine systems

Ans. (d) nervous and endocrine systems

Explanation: Reproductive or respiratory systems have no role to play in control and coordination.

Short Answer Questions

34. Label the parts (a), (b), (c) and (d) and show the direction of flow of electrical signals in Figure.



Ans. (a) Sensory neuron

(b) Spinal cord

(c) Motor neuron

(d) Muscle

35. Name the plant hormones responsible for the following

(a) elongation of cells

Ans. Auxin

(b) growth of stem

Ans. Giberellins

(c) promotion of cell division

Ans. Cytokinin

(d) falling of senescent leaves.

Ans. Abscisic acid

36. Label the endocrine glands in Figure.

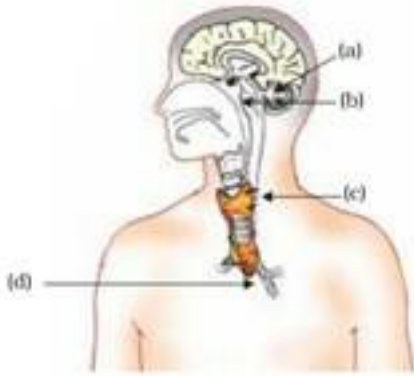


Fig. 7.3

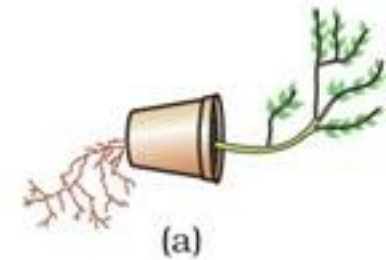
Ans. (a) Pineal gland

(b) Pituitary gland

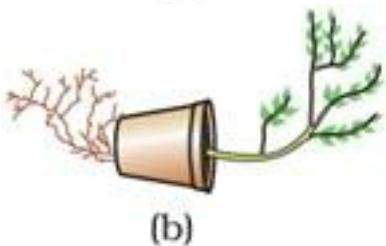
(c) Thyroid gland

(d) Thymus

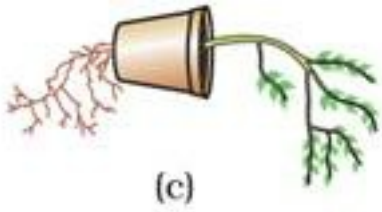
37. In figure (a), (b) and (c), which appears more accurate and why?



(a)



(b)



Ans. Figure 'a' appears more accurate. In this figure roots are showing positive geotropism, while shoot is showing negative geotropism and positive phototropism.

38. Label the parts of a neuron in Figure.

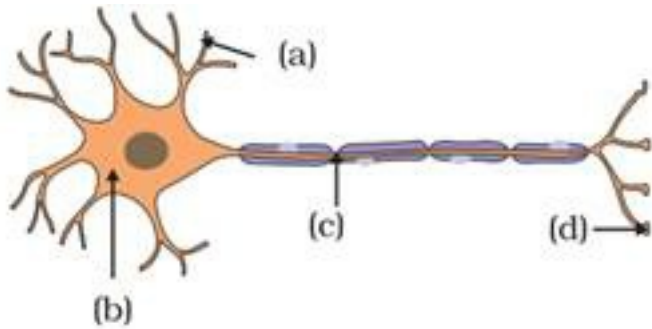


Fig. 7.5

Ans. (a) Dendrite

(b) Cell body

(c) Axon

(d) Axon terminal

39. Match the terms of Column (A) with those of Column (B)

Column A	Column B
(a) Olfactory receptors	(i) Tongue
(b) Thermal receptors (temperature receptors)	(ii) Eye
(c) Gustatoreceptors	(iii) Nose
(d) Photoreceptors	(iv) Skin

Ans. (a)-iii (b)-iv (c)-i (d)-ii

40. What is a tropic movement? Explain with an example.

Ans. The movements which are in a particular direction in relation to the stimulus are called

tropic movements. Tropic movements happen as a result of growth of a plant part in a particular direction. There are four types of tropic movements, viz. geotropic, phototropic, hydrotropic and thigmotropic.

Example : Roots usually show positive geotropic movement, i.e. they grow in the direction of the gravity. Stems usually show negative geotropic movement.

41. What will happen if intake of iodine in our diet is low?

Ans. Iodine is essential for manufacture of thyroxin in the body. If intake of iodine in our diet is low, it will reduce the production of thyroxin. This can result in hypothyroidism. It can even result in goiter.

42. What happens at the synapse between two neurons?

Ans. The junction between two neurons is called synapse. When electrical impulse reaches the axonal end of a neuron, it sets off the release of neurotransmitters in the synapse. These neurotransmitters enter the dendrite of another neuron to set off electrical signal in that neuron. That is how electrical impulse travels from one neuron to another.

43. Answer the following:

(a) Which hormone is responsible for the changes noticed in females at puberty?

Ans. Oestrogen

(b) Dwarfism results due to deficiency of which hormone?

Ans. Growth hormone

(c) Blood sugar level rises due to deficiency of which hormone?

Ans. Insulin

(d) Iodine is necessary for the synthesis of which hormone?

Ans. Thyroxin

44. Answer the following:

(a) Name the endocrine gland associated with brain?

Ans. Pituitary

(b) Which gland secretes digestive enzymes as well as hormones?

Ans. pancreas

(c) Name the endocrine gland associated with kidneys?

Ans. Adrenal gland

(d) Which endocrine gland is present in males but not in females?

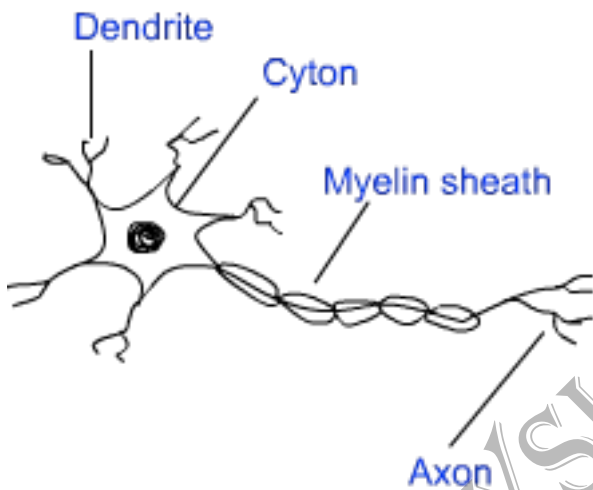
Ans. Testis

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Long Answer Questions

45. Draw the structure of a neuron and explain its function.

Ans. Neuron is a highly specialized cell which is responsible for transmission of nerve impulses. The neuron consists of the following parts:

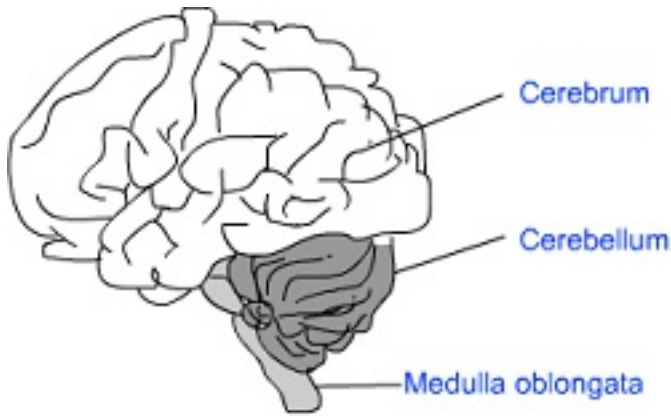


- **Cyton or cell body:** The cell body or cyton is somewhat star-shaped; with many hair-like structures protruding out of the margin. These hair-like structures are called dendrites. Dendrites receive the nerve impulses.
- **Axon:** This is the tail of the neuron. It ends in several hair-like structures; called axon terminals. The axon terminals relay nerve impulses.
- **Myelin Sheath:** There is an insulator cover around the axon. This is called myelin sheath. The myelin sheath insulates the axon against nerve impulses from the surroundings.

46. What are the major parts of the brain? Mention the functions of different parts.

Ans. The brain is covered by a three layered system of membranes; called meninges. Cerebrospinal fluid is filled between the meninges. The CSF provides cushion to the brain against mechanical shocks. The brain is located inside the skull for maximum protection.

The human brain can be divided into three regions, viz. forebrain, midbrain and hindbrain.



Human Brain

Some main structures of the human brain are explained below.

Cerebrum: The cerebrum is the largest part in the human brain. It is divided into two hemispheres; called cerebral hemispheres.

Functions of cerebrum:

- The cerebrum controls the voluntary motor actions.
- It is the site of sensory perceptions; like tactile and auditory perceptions.
- It is the seat of learning and memory.

Hypothalamus: The hypothalamus lies at the base of the cerebrum. It controls sleep and wake cycle (circadian rhythm) of the body. It also controls the urges for eating and drinking.

Cerebellum: Cerebellum lies below the cerebrum and at the back of the whole structure. It coordinates the motor functions. When you are riding your bicycle; the perfect coordination between your pedaling and steering control is achieved by the cerebellum.

Medulla: Medulla forms the brain stem; along with the pons. It lies at the base of the brain and continues into the spinal cord. Medulla controls various involuntary functions; like heart beat, respiration, etc.

47. What constitutes the central and peripheral nervous systems? How are the components of central nervous system protected?

Ans. Central nervous system is composed of the brain and spinal cord. Peripheral nervous

system is composed of nerves which are outside the spinal cord.

Central nervous system has a well-developed system for protection. Brain is enclosed in skull for protection. Spinal cord is enclosed in vertebral column for protection. Additionally, the cerebrospinal fluid provides a cushion against mechanical shocks.

48. Mention one function for each of these hormones:

(a) Thyroxin

Ans. Controls general metabolism and growth in the body.

(b) Insulin

Ans. Controls blood sugar level

(c) Adrenaline

Ans. Prepares the body for emergency situations and hence is also called 'Fight and flight' hormone.

(d) Growth hormone

Ans. Growth

(e) Testosterone.

Ans. Sperm production, development of secondary sexual characters during puberty.

49. Name various plant hormones. Also, give their physiological effects on plant growth and development.

Ans.

Plant hormones	Effect on plant growth
Auxin	Cells grow longer
Gibberellins	Growth of stem
Cytokinin	Rapid cell division in fruits and seeds
Abscisic acid	Inhibition of growth

50. What are reflex actions? Give two examples. Explain a reflex arc.

Ans. The sudden involuntary movement in a voluntary organ; in response to a stimulus; is called reflex action.

Examples of reflex action:

(a) Moving your hand away from a hot iron plate

(b) Blinking of eyes

Reflex Arc: The path of electrical impulse during a reflex action is called reflex arc. A reflex arc is composed of a sensory neuron, spinal cord, motor neuron and muscle. It involves following steps:

- The sensory neuron picks signals from the stimulus and carries the signals to the spinal cord.
- Spinal cord process the signals and sends message through the motor neuron.
- Motor neuron transmits the signals to the effector muscle so that the muscle can take immediate action.

51. “Nervous and hormonal systems together perform the function of control and coordination in human beings.” Justify the statement.

Ans. Control and coordination of functioning of various systems is under the direct control of nervous system. It is the nervous system which governs the way a particular organ or organ system has to work. This control is achieved by a complex network of neurons which carry signals in the form of electric impulses; to and from the brain.

The hormonal system, on the other hand, coordinates the functioning of nervous system. The hormonal system has somewhat indirect control on various functions. It tells a system to either slow down or pace; according to the situation.

Nervous and hormonal systems are complementary to each other. Thus, it can be said that nervous and hormonal system together perform the function of control and coordination in human beings.

52. How does chemical coordination take place in animals?

Ans. Hormones facilitate chemical control in animals. Hormones are chemicals which are directly released in bloodstream. A particular hormone reaches the target site through blood. Hormone tells the target tissue to behave in a particular manner.

To understand this, let us take the example of adrenalin. Adrenalin is secreted by adrenal gland. It reaches the heart and lungs and also to the GI tract. Heart speeds up its pumping action so that more blood could be supplied to the limbs and facial muscles. But activity of the GI tract is slowed down to ensure better blood supply in limbs. Thus, adrenalin prepares the body for a fight or flight situation.

53. Why is the flow of signals in a synapse from axonal end of one neuron to dendritic end of another neuron but not the reverse?

Ans. Electrical impulse travels through a neuron. But to be transmitted to another neuron, it needs to be passed in the form of neurotransmitters. Neurotransmitters are specialized chemicals. These can enter a neuron only through specialized channels. Such channels are present in dendrites but not in axon. On the other hand, a neurotransmitter can enter a dendrite. Due to this, the flow of signals in a synapse is from axonal end of one neuron to dendritic end of another neuron but not the reverse.