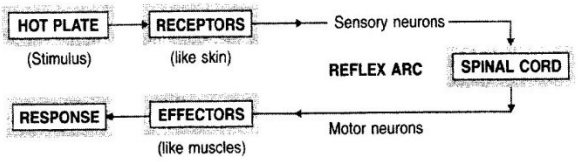
(*b*) (*i*) Dendrite (*ii*) Axon

5. (*a*) Cytokinin is present in greater concentration in the areas of rapid cell division.
   (*b*) An example of a plant growth promoter is gibberellins and example of a plant growth inhibition is abscisic acid.
6. Pancreas secretes a hormone when blood sugar rises in our body. Insulin is the hormone released by this organ and the name of the enzyme is pancreatic juice.
7. (*a*) When a growing plant detects light auxin, synthesises at the shoot tip to help the cells to grow longer. When light comes from one side, auxin diffuses towards the shady side of the shoot. This concentration of auxin stimulates the cells to grow longer on the side of the shoot which is away from light and the plant appears to bend towards light.
   (*b*) The objective of the experiment is to show phototropic movement of plant.
8. When a tendril comes in contact with any support, the part of the tendril in contact with the object does not grow as rapidly as the part away of the tendril away from the object. These cause the tendril to circle around the object and thus, cling to it.
9. A hormone called auxin is synthesised at the shoot tip.
   When a growing plant detects light, auxin synthesises at the shoot tip to help the cells to grow longer. When light comes from one side, auxin diffuses towards the shady side of the shoot. This concentration of auxin stimulates the cells to grow longer on the side of the shoot which is away from light and the plant appears to bend towards light.
10. Three endocrine glands with their function in human body are as follows :
    (*i*) **Thyroid gland**
    Functions : It secretes a hormone called thyroxine which regulates the metabolism of carbohydrates, fats and proteins in the body and so provide the best balance for growth.
    (*ii*) **Adrenal glands**
    Functions : It secretes two hormones—adrenalin and corticoids hormones which regulate blood pressure, heart beat, breathing rate, carbohydrate metabolism and mineral balance.
    (*iii*) **Pancreas**
    Function : It secretes two hormones—insulin and glucagon. Insulin hormone lowers the blood glucose. Glucagon hormone increases the blood glucose.
11. Hind-brain controls the involuntary actions.
    Cerebellum controls the coordination of body movement and posture.
    Medulla oblongata regulates centre for swallowing, coughing, sneezing and vomiting.
12. Chemotropism is the movement of a part of the plant in response to a chemical stimulus. It can be positive chemotropism or negative chemotropism.
    Example : The growth of pollen tube towards a chemical which is produced by on ovule during the process of fertilisation in a flower.
    Two plant hormones with their functions are as follows :
    Auxins promotes cell elongation, root formation, cell division, respiration and other physiological processes like protein synthesis, etc.
    Gibberellins stimulates stem elongation, seed germination and flowering.
13. The structural and functional unit of nervous system *i.e.*, neuron with their functions are as follows :
    (*i*) **Cell body :** Stimulus received from dendrite is changed into impulse in the cyton.
    (*ii*) **Dendrites :** They receive sensation or stimulus, which may be physical, chemical, mechanical or electrical. They pass the stimulus to cyton.
    (*iii*) **Axon :** It conducts impulse away from the cell body.
14. The **Reflex Arc** pathway is shown in the flow chart as follows :



    Reflex arc does not involve brain. It minimises the overloading of brain.
15. **Phototropism** is the directional growth movement of curvature of plant organs in response to unidirectional exposure to light.
    Phototropism in plants :
    Plants bend towards light when they are exposed to it. The aerial shoots usually grow towards light, while some aerial roots grow away from light. This response is controlled by the differential distribution of the plant growth substance auxin in the illuminated part which causes differential growth of the shoot or root.
    Activity to demonstrate phototropism :
    A conical flask with water is taken and neck of which is covered by a wire mesh. 2 or 3 freshly germinated bean seeds, are kept on the wire mesh. A cardboard box is taken with one side open, the flask is kept inside the box so that open side of the box receives light from a window. After 2-3 days, it will be seen that shoots bend towards light and roots away from light.
16. **Reflex Action.** It is defined as an unconscious, automatic and involuntary response of effectors, *i.e.*, muscles and glands, to a stimulus, which is monitored through the spinal cord.
    Mechanism of Reflex Action. It involves the following steps :
    (*i*) Receptor organ like skin perceives the stimulus and activates a sensory nerve impulse.
    (*ii*) Sensory organ carries message in the form of sensory impulse to the spinal cord.
    (*iii*) The spinal cord acts as modulator. The neurons of spinal cord transmit the sensory nerve impulse to motor neuron.
    (*iv*) Motor nerve conducts these impulses to the effectors like leg muscles which responds by pulling back the organ away from the harmful stimulus.
17. Hormones are the chemical substances which coordinate and control the activities of living organisms and also their growth. The hormone secreted by thyroid is thyroxine. Its function is to regulate the metabolism of carbohydrates, fats and proteins in the body so as to provide the best balance for growth.
    The use of iodised salt is advised to us because iodine is necessary for the thyroid gland to produce thyroxine hormone. Thyroxine regulates carbohydrate, protein and fat metabolism which is required for growth. Deficiency of iodine in the body causes disorder like swollen neck and disease called goitre.

18. (*a*) Touch
(*b*) A - away from contact. B - at the point of contact.
(*c*) A - change in amount of water/turgor pressure
B - uneven growth/growth

19. 'Hydrotropism' is the directional growth of a plant part in response to water.
Example, roots show hydrotropism as they grow towards water in the soil and are positively hydrotropic.

An experiment to demonstrate hydrotropism are as follows :
(*i*) A porous pot filled with water is taken and is inserted in a tub filled with dry sand.
(*ii*) A freshly germinated pea seedling is sowed in the sand.
(*iii*) As water is not available in sand, the root growing will bend towards the porous pot filled with water.
(*iv*) A hydrotropic curvature of the root is observed as it grows towards water.
(*v*) This bending of root shows the movement in response towards water.

20. **Hormones** are the chemical substances which coordinate and control the activities of living organisms and also their growth. The term hormone was introduced by Bayliss and Starling.
Function
(*i*) Thyroxine hormone regulates the metabolism of carbohydrates, fats and proteins in the body so as to provide the best growth balance.
(*ii*) Insulin hormone helps in regulating sugar level in the blood.

21. (*a*) The two main constituents of the Central Nervous system in human beings are the brain and the spinal cord.
(*b*) The different organs of our body work in coordination when we perform any activity. For example, when we are taking food, our eyes help in locating the food, our nose detects the smell, our hand brings the food to our mouth, the teeth and jaw muscles chew the food and saliva starts the digestive process.
So, control and coordination is essential in maintaining a state of stability and a steady state between the internal conditions of an organism and the external environment.

22. The animal or plant hormone which is associated with the following are as follows :
(*i*) Increased sugar level in blood – **Insulin** hormone
(*ii*) Changes at puberty in boys – **Testosterone** hormone
(*iii*) Inhibits growth of plants – **Abscisic Acid (ABA)**
(*iv*) Rapid development of fruits – **Cytokinin** hormone
(*v*) Dwarfism – **Growth** hormone (GH)
(*vi*) Goitre – **Thyroxine** hormone

Important Questions

23. (*i*) **Prolactin :** Anterior lobe of pituitary. It stimulates the secretion of milk from mammary glands after childbirth in case of females.
(*ii*) **Calcitonin :** It is secreted by some cells outside the follicles of thyroid gland. It lowers the concentration of calcium and phosphate in the blood.

24. (*i*) **Insulin : Source** – b-cells of Islets of Langerhans.
Function – It reduces the blood glucose level in the body.
(*ii*) **Testosterone : Source** - Leydig cells of testes.
Function – It promotes the growth and development of male secondary sex organs.

25. (*i*) **Parathormone** – Parathyroid. It increases the concentration of Ca^{++} in blood plasma.
(*ii*) **Progesterone** - Corpus luteum of ovary. It brings about most of the pregnancy changes such as uterine growth, implantation, formation of placenta, etc.

26. The Nervous system integrates sensory information and controls the activities of muscular and skeletal systems. The endocrine system coordinates body parts by using chemicals called hormones. Hormones regulate many functions like growth, development and reproduction in our body.
Digestion of food, breathing, transport of nutrients are all regulated by the nervous system with the help of endocrine system.
The nervous system and hormonal system do not work in isolation, but interact with one another to regulate the body functions. The level of all hormones in the blood is controlled by a part of the brain.

27. *Amoeba* moves towards food and tends to aggregate in moderate warm water. *Amoeba* and other protozoa avoid mechanical obstacles. Thus, unicellular organisms respond to stimuli. Roots of plants move downward in response to gravitational force and shoots of plants move towards light. This shows that plants respond to stimuli.

28. (*a*) **Nerve impulses** is the information in the form of chemical and electrical signals passing through neurons. These impulses are carried by dendrites towards the cell body.
(*b*) **Axon** is the longest part of the neuron. It is a single, elongated, fibre arising from one side of cyton. It conducts impulses away from the cell body.
(*c*) **Olfactory receptors** is a specialised structure for sensation of smell.

29. **Cerebrospinal fluid** is a clear alkaline fluid that occupies the space between the meninges of brain and spinal cord, cerebral ventricles inside the brain and central canal inside the spinal cord.
Functions :
(*i*) It provides protection to the brain and spinal cord against any shock and mechanical injury.
(*ii*) It facilitates the exchange of nutrients and wastes among nerve tissues.
(*iii*) It provides rigidity and strength to the cranium.

30. There are various organ systems in all the living organisms which perform various physiological processes. These organ systems cannot work independently. All the systems are interlinked. Working together of all these systems is called

coordination, which are of two types — chemical coordination and nervous coordination. All these system work in coordination and are controlled by each other. There are many organs in the body of which growth and functions are controlled by the secretions of other organs or glands like pituitary gland.

31. **Auxins**

(*i*) Auxins are hormones which promote growth of the shoot.

(*ii*) They influence the plant after physiological activities like falling of leaves, formation and ripening of fruits and flowering.

Gibberellins

(*i*) Gibberellins are also plant hormones which cause elongation of internodes of dwarf plants.

(*ii*) Their high dose breaks the dormancy of seeds. They also influence flowering, control seed germination, induce flowering and parthenocarpy.

32. **Auxins**

(*i*) They are the growth hormones.

(*ii*) They are synthesised in the shoot tip.

(*iii*) They are responsible for growth, root formation and production of parthenocarpic fruits.

Cytokinins

(*i*) They are responsible for cell division.

(*ii*) They are synthesised in the endosperms of seeds and roots.

(*iii*) They are responsible for cell division, ageing, initiation of roots, shoots and apical dominance.

33. We will take the example of adrenal glands to show how the endocrine system coordinates our body activities. There are two adrenal glands in our body, one on top of each kidney. The adrenal glands make adrenaline hormone. The adrenaline hormone prepares our body to function at maximum efficiency during emergency situations like danger, anger, excitement, etc. This happens as follows :

When we are faced with a dangerous situation then our nervous system stimulates the adrenal glands to secure more adrenaline hormone into our blood. This adrenaline hormone increases our heart beat, breathing rate, blood flow into muscles and causes liver to put more stored glucose into our body. All these actions of adrenaline hormone produce a lot of energy in our body very, very quickly. And this energy helps us to run away very fast from the dog to save ourselves. In this way, adrenaline hormone prepares our body to run away very fast from a frightening object. Similarly, it is the adrenaline hormone which prepares our body to fight an enemy by providing us a lot of energy in a very short time.

NCERT Questions

34. Chemical coordination takes place in animals with the help of some chemical substances called hormones. Hormones are secreted by endocrine glands. The timing and amount of hormones released are regulated by feedback mechanisms.

35. The function of receptors in our body is to detect informations from the environment. These receptors are located in our sense organs. There are some situations where receptors do not work properly, like mouth starts watering when we feel hungry, touching a flame, knee-jerk, etc. In such situations, they take more time if these are done by the brain. To solve these problems, the nerves move muscles in a simpler way by the spinal cord.

36. In plants, the stimulated cells release chemical compounds which are called plant hormones. Different plant hormones help to coordinate growth, development and responses to the environment. They are synthesised at places away from where they act and simply diffuse to the area of action.

37. **Nervous mechanism**

(*i*) It is performed by nervous system receiving information from receptors and acts through effectors.

(*ii*) Chemical change occurs in the cellular composition of muscular cells.

(*iii*) The information is transmitted instantaneously.

(*iv*) The system is directly connected to tissues or organs under its control.

Hormonal mechanism

(*i*) It is performed by chemical substances called hormones secreted by endocrine glands.

(*ii*) Hormones produced in one part of the organism, move to other part of the body to achieve the desired change.

(*iii*) The information is transmitted slowly.

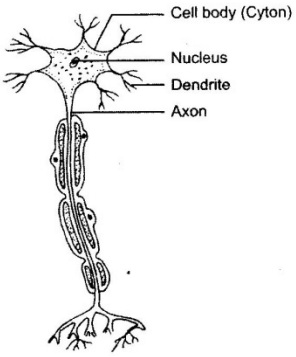
(*iv*) The system is not directly connected to organs or tissues under its control.

38. When a part of sensitive plant is touched, the information that the plant has been touched is communicated from cell to cell using electrical and chemical means, but plants have no specialised tissue for the conduction of information. Thus, the cell changes its shape. In animals, movement of legs is controlled by nervous system. Movement of legs is a voluntary action. When we move our legs, the brain takes action based on thinking. Forebrain is associated where the sensory information is interpreted by putting together all informations from receptors as well as the information already stored in the brain. On this basis, decision is taken and information is passed to motor areas which control the movement of voluntary muscles.

LONG ANSWER TYPE QUESTIONS [5 MARKS]

Previous Years' Questions

1. (*a*)



A nerve cell (Neuron)

(*b*) The part of neuron :

(*i*) where information is acquired — end of the dendritic tip of a nerve cell.

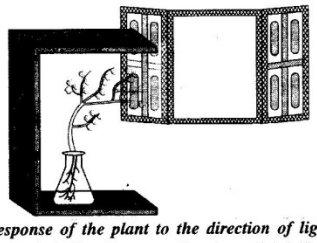
(*ii*) through which information travels as an electrical impulse — from the dendrite to the cell body and then along the axon to its end.

2. (*a*) (*i*) **Phototropism** is the movement of a part of the plant in response to light.

(*ii*) **Geotropism** is the upward and downward growth of shoots and roots in response to the pull of earth or gravity.

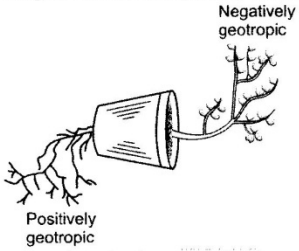
Activity **:** To show that light and gravity change the direction what plant's parts grow.

A conical flask is filled with water and the neck of the flask is covered with a wire mesh. Then two or three freshly germinated bean seeds are kept on the wire mesh. And a cardboard box opened from one side is taken. The flask is kept in the box in such a way that the open side of the box faces light coming from a window. After two or three days, it is noticed that the shoots bend towards light and roots away from light. Now, the flask is turned so that the shoots are away from light and the roots towards light and this condition is left undisturbed for a few days.



Response of the plant to the direction of light

Thus, it is seen that light or gravity will change the directions that plant parts grow. These tropic movements can be either towards the stimulus or away from it. So, in two different kinds of phototropic movement, shoots respond by bending towards light while roots respond by bending away from it.



Plant showing geotropism

Plants also show tropism in response to other stimuli as well. The roots of a plant always grow downwards while the shoots usually grow upwards and away from the earth. This direction of growth in response to gravity is termed geotropic, growth of the plant towards the centre of the earth is **positively geotropic** (*i.e.*, main roots) and growth away from the centre of earth is **negatively geotropic** (*i.e.*, main stems).

(*b*) The role of the following plant hormones are as follows :

(*i*) **Auxin :** It promotes cell elongation, root formation, cell division, respiration and other physiological processes like protein synthesis, water intake and protoplasmic permeability.

(*ii*) **Abscisic acid :** It is a hormone which inhibits growth. Its effects include wilting of leaves.

3. (*a*) (*i*) A – Dendrite

B – Axon

(*ii*) The information in the neuron is acquired at the end of the dendrite tip.

(*iii*) The information travels from the dendrite to the cell body and then along the axon to its end.

(*iv*) The information travels in the form of an impulse.

(*v*) The impulse is converted into a chemical signal at the end of the axon.

(*b*) Thyroxine hormone is secreted by thyroid.

Function of Thyroxine hormone :

It regulates carbohydrate, protein and fat metabolism in the body so as to provide the best balance for growth.

The use of iodised salt is advisable because iodine is essential for the synthesis of thyroxin. In case of iodine deficiency in our diet, there is a possibility one can suffer from goitre, which is a disease of swollen neck.

Important Questions

4. (*a*) Plant hormones are chemical substances which is produced naturally in plants and are capable of translocation and regulating one or more physiological processes when present in low concentration.

(*i*) A plant hormone that promotes growth – Cytokinins.

(*ii*) A plant hormone that inhibits growth – Abscisic Acid.

(*b*) A, B and C are all parts of Hind-brain.

A – **Pons**. It regulates respiration.

B – **Medulla oblongata**. It controls all the involuntary actions like blood pressure, salivation and vomiting.

C – **Cerebellum**. It is responsible for precision of voluntary actions and maintaining the posture and balance of the body.

5. The three major components of nervous system in animals are : (*i*) Brain, (*ii*) Spinal cord and (*iii*) Nerves.
Nerves are classified into :
(*i*) Cranial nerves, (*ii*) Spinal nerves and (*iii*) Visceral nerves.
The three major types of nervous system are :
(*i*) Central nervous system, (*ii*) Peripheral nervous system and (*iii*) Autonomic nervous system.

In Central Nervous System, information is received from sense organs and impulses are sent to effector organs.

Peripheral Nervous System plays an important role in sending the nerve impulse.

Autonomic Nervous System mainly controls and integrates the functions of internal organs like heart, blood vessels, glands, etc.

6.

Plant Movements

Tropic Movements

e.g., (*i*) **Phototropism**
Bending of plant in response to light.
(*ii*) **Chemotropism**
Movement in response to chemical stimulus.
(*iii*) **Geotropism**
Movement of plant's parts in response to gravitational force.

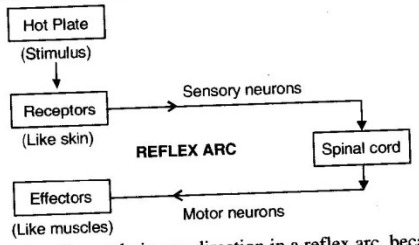
Nastic Movements

e.g., (*i*) Twirling of tendril.
(*ii*) Opening of flower.
(*iii*) Leaves of 'touch-me-not' plant bend and droop on touching.

7. Six reflex actions of the body are :
(*i*) When we see a speeding car moving towards us, we move aside.
(*ii*) We withdraw our hands on being pricked by a pin.
(*iii*) We withdraw our hands on touching very hot substance.
(*iv*) We close our eyes on seeing direct sun or extremely bright source of light.
(*v*) We close our eyes on hearing a loud noise.
(*vi*) We shiver on feeling cold.
Reflex arc in all the above cases is same because in all the cases, the stimulus is received by sense organs. Then this information is carried to spinal cord through sensory nerves. Thus, information from spinal cord is sent to the effectors such as muscles *via* motor neurons.

Receptors $\xrightarrow[\text{Neurons}]{\text{Sensory}}$ Spinal cord $\xrightarrow[\text{Neurons}]{\text{Motor}}$ Effectors

8. **Reflex arc** is the pathway taken by the nerve impulses and responses in a reflex action, *i.e.*, from the receptor organs like skin to the spinal cord and from the spinal cord to the effector organs like muscles.

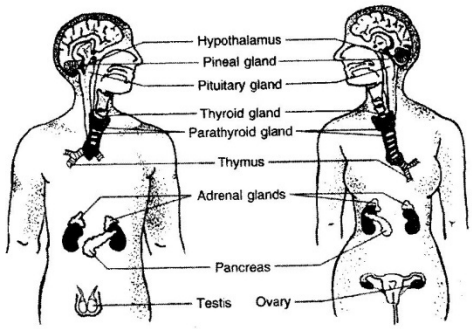


Impulses flow only in one direction in a reflex arc, because each synapse in the reflex arc allows impulses to cross it in a single direction.

9. Table below shows the different Endocrine glands, hormones secreted by them and their functions.

Endocrine glands	Hormones	Functions
(*i*) Hypothalamus	Releasing hormones	Regulation of the secretion of hormones from pituitary gland.
(*ii*) Pituitary (Hypophysis)	Growth hormone	Development of bones and muscles.
	Trophic hormone	Regulation of the secretion of hormones from endocrine glands like adrenal, thyroid, testes and ovary.
	Prolactin	Regulation of function of mammary gland.
	Vasopressin	Regulation of water and electrolyte balance.
	Oxytocin	Regulation of the ejection of milk during lactation.
(*iii*) Thyroid	Thyroxine	Regulation of metabolism of carbohydrate, fat and protein.
(*iv*) Parathyroid	Calcitonin	Regulation of blood, calcium and phosphate.
(*v*) Thymus	Thymosin	Activates immune responses and helps in the production of antibodies.
(*vi*) Adrenal	Adrenaline and Corticoids	Regulation of blood pressure, heart beat, carbohydrate metabolism and mineral balance.
(*vii*) Pancreas	Insulin	Lowering of blood glucose.
	Glucagon	Increasing of blood glucose.
(*viii*) Testis	Testosterone	Regulation of male accessory sex organs and secondary sexual characters like moustache, beard and voice.
(*ix*) Ovary	Estrogen and Progesterone	Regulation of female accessory sex organs and secondary sexual characters like mammary gland, hair pattern and voice. Maintenance of pregnancy.

10. A group of endocrine glands which produce various hormones is called **endocrine system** or **hormonal system**.
The endocrine system helps in coordinating the activities of our body.
The endocrine system in our body consists of a number of glands which make, store and release chemicals called hormones.
The endocrine glands present in the human body are as follows— Hypothalamus gland, Pituitary gland, Pineal gland, Thyroid gland, Parathyroid glands, Thymus gland, Adrenal glands, Pancreas, Testis (in male) and Ovaries (in females).
The position of all these endocrine glands in the human body (male/female) are shown in the figure alongside.



Endocrine glands in human beings (a) male (b) female

NCERT Question

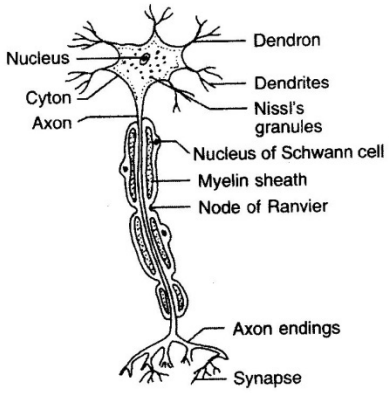
11. The units which make up the nervous system are called nerve cells or **neurons**. So, neurons are the structural and functional unit of the nervous system.
- Neuron is the largest cell in the body.
- Neurons carry messages in the form of electrical signals called nerve impulses.
- Neuron is an elongated branched cell having three components — Cell body, Dendrites and Axon.

(*i*) **Cell body or Cyton** is like a typical cell containing a central nucleus and surrounding cytoplasm. Stimulus is changed into impulse in the cyton.

(*ii*) **Dendrites** receive sensation or stimulus, which may be physical, chemical, mechanical or electrical. The stimulus is passed onto cyton.

(*iii*) **Axon** is the longest part of the neuron. It is a single, elongated fibre arising from one side of cyton. It conducts impulses away from the cell body.

Function of Neuron. The impulses of information travel from dendrites to cell body and then along the axon to its end. These impulses cross the synapse. At the end, the impulses travel from one neuron to the other up to the spinal cord or to the concerned part of the body.

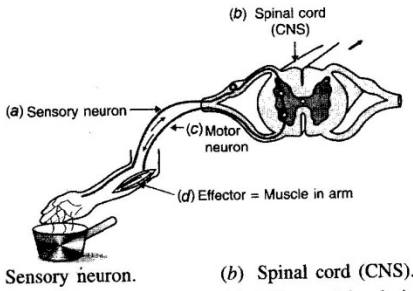


A nerve cell (Neuron)

NCERT Exemplar Problems

SHORT ANSWER TYPE QUESTIONS

1.



(*a*) Sensory neuron. (*b*) Spinal cord (CNS).
(*c*) Motor Neuron. (*d*) Effector (Muscle in arm).

The direction of flow of electrical signals will be
(*i*) Receptor (hand) to spinal cord through sensory neuron.
(*ii*) Sensory neuron to motor neuron through relay neuron.
(*iii*) Spinal cord to effector through motor neuron.

2. (*a*) Elongation of cells – Auxin
(*b*) Growth of stem – Gibberellin
(*c*) Promotion of cell division – Cytokinin
(*d*) Falling of senescent leaves – Abscisic acid

3. (*a*) Pineal gland (*b*) Pituitary gland
(*c*) Thyroid gland (*d*) Thymus gland.

4. Figure (*a*) appears more accurate because it shows appropriate response of both shoot and root as in a plant, shoots are negatively geotropic; hence, it grows upward and roots are positively geotropic; so it grows downward.

5. (*a*) Dendrite (*b*) Cell body or cyton
(*c*) Axon (*d*) Nerve endings

6. (*a*) – (*iii*), (*b*) – (*iv*), (*c*) – (*i*), (*d*) – (*ii*)

7. Tropic movement is the directional growth movement of plants due to external stimuli which can be either towards the stimuli or away from it.
Example : In phototropic movement, shoots respond by bending towards light while roots respond by bending away from it.

8. If intake of iodine in our diet is low, it will affect the production of thyroxine from thyroid gland which will be less and affect the metabolism of protein, carbohydrate and fat. With reduced intake of iodine, thyroid gland enlarges, resulting in swelling of neck thus, a person suffers from goitre.

9. At the synapse between two neurons, when an electrical signal reaches the axonal end of one neuron, it releases certain chemical substances that cross the synapse and move towards the dendritic end of next neuron generating another electrical signal.

LONG ANSWER TYPE QUESTIONS

12. The major parts of the brain are :
    (*i*) **Forebrain** including cerebrum and olfactory lobes.
    (*ii*) **Midbrain**
    (*iii*) **Hindbrain** including cerebellum, pons and medulla oblongata.

    Functions of different parts are as follows :
    (*i*) **Forebrain cerebrum :** There are specific regions in cerebrum for each kind of stimulus and response.
    (*a*) Occipital lobe is the region for sight, *i.e.*, visual reception.
    (*b*) Temporal lobe is the region for hearing, *i.e.*, auditory reception.
    (*c*) Frontal lobe is the region for speech, facial muscular activities and higher mental activities.
    (*d*) Parietal lobe is the region for taste, smell, touch and conscious association.
    (*e*) Olfactory lobe receives sensation of smell.
    (*ii*) **Midbrain :** It controls reflex movements of the head, neck and trunk in response to visual and auditory stimuli.
    (*iii*) **Hindbrain :**
    (*a*) **Cerebellum** controls the coordination of body movements and posture.
    (*b*) **Pons** take part in regulating respiration.
    (*c*) **Medulla oblongata** is the regulating centre for swallowing, coughing, sneezing and vomiting.
13. The central nervous system (CNS) has two parts – brain and spinal cord.

10. (*a*) Oestrogen (*b*) Growth hormone
    (*c*) Insulin (*d*) Thyroxine
11. (*a*) Pituitary gland (*b*) Pancreas
    (*c*) Adrenal glands (*d*) Testes

    The peripheral nervous system (PNS) has two components – voluntary and involuntary.
    The components of central nervous system, *i.e.*, brain is protected by brain box or cranium and spinal cord is protected by the vertebral column.
14. The various plant hormones are auxin, gibberellin, cytokinin and abscisic acid.
    Their physiological effects on plant growth and development are as follows :
    Auxin – Cell elongation, cell division, root formation, apical dominance, inhibition of abscission and fruit growth.
    Gibberellin – Growth in stem and leaves, higher fruit yield and overcoming dormancy.
    Cytokinin – Promotes for cell division, differentiation, prevention of senescence and overcoming apical dominance.
    Abscisic acid (ABA) – Induces dormancy, senescence and abscission, checking excessive activity of growth promoting hormone and closure of stomata under water stress.
15. When an electrical signal reaches the axonal end of a neuron, it releases a chemical substance. This chemical diffuses towards the dendritic end of next neuron where it generates an electrical signal which is converted into a chemical signal at the axonal end since, these chemicals are absent in dendritic end of the neuron, the electrical signal cannot be converted into chemical signal and the reverse flow of electrochemical impulse is not possible.

VALUE BASED QUESTIONS

1. (*a*) The values showed by the police persons were truthful to duty and humanity.
   (*b*) Injury to brain or spinal cord can cause paralysis.
   (*c*) Riders must wear helmets while riding a two-wheeler. One must drive in a controlled speed to avoid accident.
2. (*a*) Mrs. Bora showed the value of adequate knowledge on a subject and capability to use it when required.
   (*b*) We immediately remove the hand from the hot object due to reflex action.
   (*c*) Hot running water, hot tea/coffee/milk/water, hot cooking ware, hot food items and hot electrical appliances are other common materials which commonly cause burn injury.
3. (*a*) The plants have bent due to phototropism. Light might have fallen on the plants from a window due to which all the plants have bent towards the direction of the light *i.e.*, phototropism.
   (*b*) She can keep the plants outdoor for an interval to keep them straight.
   (*c*) No. Animals do not show phototropism.
   (*d*) She is a nature loving person.
4. (*a*) When a person suffers from diabetes, his blood sugar level increases.
   (*b*) If blood sugar is consistently high, over time it can affect the heart, eyes, kidneys, nerves, and other parts of the body. A person suffering from diabetes cannot undergo any operation unless his blood sugar level is brought down with medication before the operation.
   (*c*) The injection given by the pharmacist is an insulin injection. Insulin is a hormone secreted by pancreas which helps in regulating blood sugar. In case of my grandfather, the pancreas is not able to release adequate quantity of insulin hormone and hence his blood sugar level is high. Insulin provided externally will help in regulating his blood sugar level.
   (*d*) He is a responsible person and who serves people.
5. (*a*) No. I do not agree with Hari Singh.
   (*b*) There might be deficiency of iodine in food of the village children. Iodine is necessary for the thyroid glands to make thyroxine hormone. Thyroxine regulates carbohydrate, protein and fat metabolism in the body to give best balance for growth. The problem can be overcome by adding iodine in food which can be done by consuming iodised salt in place of ordinary salt.
   (*c*) Education opens the eyes of people. People of the village must be motivated to send their children to school. Even the adults must be encouraged to attend adult education programme. The villagers should be explained that a doctor can solve health problems and they should therefore go to a doctor in case of health problems.
   (*d*) Shyam is not superstitious. He believes on actual scientific fact.