Chapter 7 Control And Coordination

Very Short Answer Type Question [1 Mark]

Q. Why is it advised to use iodised salt in our diet ?

Answer. Iodine stimulates the thyroid gland to produce thyroxin hormone. Deficiency of this hormone results in the enlargement of the thyroid gland. This can lead to goitre.

Q. Give an example of a plant hormone that promotes its growth. Where it is synthesized ?

Answer. Plant hormone that promotes growth is auxin. It is synthesized at the tip of the plant stem.

Q. State the function of:
(i) gustatory receptors, and
(ii) olfactory receptors.

Answer.
(i) Gustatory receptors – these are sensitive to taste
(ii) Olfactory receptors – these are sensitive to smell.

Q. Name the part of the brain which controls posture and balance of the body.

Answer. Cerebellum in hind-brain controls the posture and balance of the body.

Q. Mention the part of the body where gustatory and olfactory receptors are located.

Answer. Gustatory receptors are located in Cerebrum of fore-brain. Olfactory receptors are located in Olfactory lobe of fore-brain.

Q. Smita's father has been advised by a doctor to reduce his sugar intake.

1. **Name the disease he is suffering from and name the hormone whose deficiency is? ,**
2. **Identify the gland that secretes it and mention the function of this hormone.**
3. **Explain how the time and amount of secretion of this hormone is regulated in human system.**

Answer.

1. He is suffering from diabetes. Deficiency of insulin causes diabetes.
2. Pancreas secretes insulin. Insulin helps in regulating blood sugar.
3. When the sugar level in blood increases, it is detected by the a-cells of the pancreas which responds by producing more insulin. As the blood sugar level falls, insulin secretion is reduced.

Q. State the functions of plant hormones. Name four different types of plant hormones.

Answer. Plant hormones help to coordinate growth, development and responses in environment. Four different types of plant hormones are – Auxins, Gibberellins, Cytokinins, Ethylene and Abscisic acid.

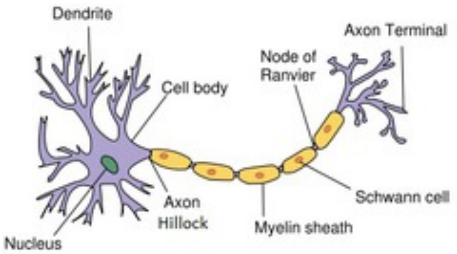
1. Auxins control the tropic (growth related) movements of the plants in response to light, gravity, touch etc by increasing the size of cells. Under the influence of auxins, the plant stem bends towards unidirectional light where as the roots bend away from it.
2. Gibberellins stimulate stem elongation and leaf expansion. Its application causes stem elongation in small plants such as cabbage. Spraying gibberellins on sugarcane plant increases the stem size and hence the yield.

3. Cytokinins are produced in regions of the plant body where rapid cell division occur, such as root tips, developing shoot buds, young fruits and seeds. Cytokinins promote growth by stimulating cell division. They also help in production of new leaves and chloroplasts in leaves.
4. Ethylene causes ripening of the fruits.
5. Abscisic acid inhibits (i.e., slows down) the growth in different parts of the plant body. It also inhibits germination of seeds. It increases the tolerance of plant to different kinds of stresses such as temperature changes. So, it is also called the stress hormone in plants. It also causes the drying and falling of older leaves, flowers and fruits.

Q. (a) How is brain protected from injury and shock?
(b) Name two main parts of hind brain and state the functions of each.

Answer.
(a) Brain is covered by a three layered membrane called meninges. In between the layers of meninges and brain, cavity fluid named Cerebro Spinal Fluid (CSF) is filled. The hard skull covers the meninges. Thus Meninges, CSF and Skull protects our brain for a certain extent.
(b) Two main parts of hind-brain are — Medulla and Cerebellum. Their functions are:
Medulla : Involuntary actions such as blood pressure, salivation and vomiting.
Cerebellum : It is responsible for precision of voluntary actions and maintaining the posture and balance of the body.

Q. (a) Draw the structure of neuron and label cell body and axon.
(b) Name the part of neuron:
(i) where information is acquired
(ii) through which information travels as an electrical impulse.
Answer.



(a) A nerve cell (Neuron)
(b) (i) Dendrite (ii) Axon

Q. (a) Which plant hormone is present in greater concentration in the areas of rapid cell division?
(b) Give one example of a plant growth promoter and a plant growth inhibitor.

Answer.
(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 inhibitor is abscisic acid.

Q. How is the spinal cord protected in the human body?

Answer. Spinal cord is enclosed in a bony cage called vertebral column.

Q. A potted plant is made to lie horizontally on the ground. Which part of the plant will show
(i) positive geotropism?
(ii) negative geotropism?

Answer.
(i) Root (ii) Shoot.

Q. Mention the function of the hind-brain in humans.
Answer. Hind brain controls respiration, cardio-vascular reflexes and gastric secretions.
It also modulates the motor commands initiated by the cerebrum.

34. Mention the function of adrenaline hormone.
Answer. Adrenaline hormone is released into the blood from the adrenal gland during stimulation of the nervous system on seeing any adverse situation of fight or fright, it:

1. increases the blood pressure.
2. increases heart beat rate.
3. increases breathing rate.
4. diverts blood to essential organs including the heart, brain and skeletal muscles by dilating their blood vessels and constricting those of less essential organs, such as the skin and digestive system.

Q. A young green plant receives sunlight from one direction only. What will happen to its shoots ?

Answer. Shoots will bend towards the light and roots away from the light.

Q. Name the plant hormones which help/promote (i) cell division (ii) growth of the stem and roots?

Answer. The plant hormones which help or promote:
(i) Cell division — Cytokinins
ii) Growth of the stem — Gibberellins

Q. What is the function of thyroxine hormone in our body ? jlMluK r

Answer. Thyroxine hormone regulates the carbohydrate, protein and fat metabolism in the body so as to provide the best growth balance.

Q. Name two tissues that provide control and coordination in multicellular animals.

Answer. The two tissues that provide control and coordination in multicellular animals are nervous and muscular tissues.

Q. Which one of the following actions on touch is an example of chemical control?
(i) Movement on the touch-sensitive plant.
(ii) Movement in human leg.

Answer.
(i) Movement on the touch-sensitive plant.

Short Answer Type Question [2 Marks]

Q. (i) Name the hormones that are released in human males and females when they reach puberty.
(ii) Name a gland associated with brain. Which problem is caused due to the deficiency of the hormone released by this gland ?

Answer.
(i) Testes in males produces hormone testosterone.
Ovaries in females produces hormone oestrogen.
(ii)Pituitary gland present in the brain is responsible for body growth, development of bones and muscles (if excess-gigantism) (if less-dwarfism).

Q. Name, the two main organs of our central nervous system. Which one of them plays a major role in sending command to muscles to act without involving thinking process? Name the phenomenon involved.

Answer. The two main organs of CNS are brain and spinal cord.
Spinal cord plays a major role in sending command to muscles to act without involving thinking process. This phenomenon is called reflex action.

Q. Name the hormone secreted by human testes. State its functions.

Answer. Testes secrete male sex hormone called testosterone. The function of testosterone is to regulate male accessory sex organs and secondary sexual characters like moustache, beard and voice.

Q. Name and explain the function of the hormone secreted by the pituitary gland in humans.
Answer. Hormones secreted by pituitary gland alongwith their functions are:

1. **Grpwth hormone:** It regulates growth and development ofbones and muscles.
2. **Trophic hormone:** It regulates secretion of hormones from other endocrine glands.
3. **Prolactin hormone:** It regulates the function of mammary glands in females.
4. **Vasopressin hormone:** It regulates water and electrolyte balance in the body,
5. **Oxytocin hormone :** It regulates ejection of milk during lactation.

Q. What are 'nastic' and 'curvature' movements? Give one example of each.

Answer. Nastic movements: These are non-directional movements which are neither towards nor away from the stimulus. Example: Dropping of leaves.
Curvature movements: In such movements plant organs move towards or away from the stimulus. Example: Bending of shoot towards a source of light.

Q. Write the name and functions of any two parts of the human hind-brain.

Answer. Any two parts of human hind-brain with their functions are as follows:
(i) Cerebellum, which controls the coordination ofbody movement and posture. (ii) Medulla oblongata, which regulates the centre of swallowing, coughing, sneezing and vomiting.

Q. What are plant hormones? Write two important functions of auxin.

Answer. Plant hormones can be defined as a chemical substance which is produced naturally in plants and are capable of translocation and regulating one or more physiological processes when present in low concentration. .
Two important functions of auxin are that it promotes cell elongation, root formation, cell division, etc.

Short Answer Type Questions [3 Marks]

Q. State how concentration of auxin stimulates the cells to grow longer on the side of the shoot which is away from light ?

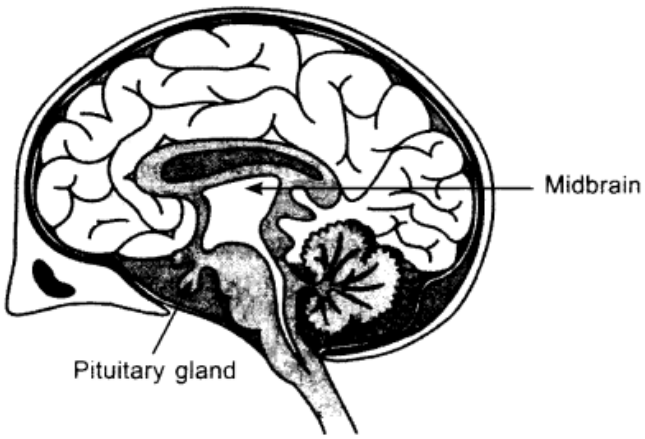
Answer. When light falls on the side of the shoot auxin diffuses towards the shady side of the shoot. This concentration of the auxin stimulates the cell to grow longer on the side of the shoot which is away from light. Thus plant appears to bend towards light.

Q. What is synapse ? In a neuron cell how is an electrical impulse created and what is the role of synapse in this context ?

Answer. A synapse is the gap between the two neurons. Here the axon terminal of one neuron is in close proximity to the dendrite of the second neuron. When a nerve impulse reaches the knob like nerve ending of an axon, a tiny amount of a chemical substance is released in the synapse. This chemical substance is called as the neurotransmitter. At synapse the electrical signals converted into chemicals, that can easily cross over the gap and pass on to the next neurons where it again converted into electrical signals.

Q. Draw neat diagram of human brain and label on it the following parts :
(i) Midbrain (ii) Pituitary gland

Answer.



Human brain

Q. Write one example each of the following tropic movements :
(i) Positive phototropism (ii) Negative phototropism
(iii) Positive geotropism (iv) Negative geotropism
(v) Hydrotropism (vi) Chemotropism

Answer.
(i) Positive phototropism: shoots growing towards light.
(ii)Negative phototropism: roots growing away from light towards ground.
(iii) Positive geotropism: growth of roots towards earth due to the pull of the earth.
(iv)Negative geotropism: shoots growing away from the earth.
(v) Hydrotropism: roots growing towards the source of water.
(vi)Chemotropism: growth of pollen tubes towards the ovules.

Q. (a) Explain any three directional movements in plants.
(b) How brain and spinal cord are protected in human ?
(c) Name the master gland present in the brain.

Answer.
(a) Stimuli is responsible for the movement of the plant parts towards or away from it. This movement is called as Tropic Movement.
Phototropism: movement of plant towards or away from the light. **Geotropism:** movement of plant parts towards the earth or away from it. **Hydrotropism:** movement of plant parts towards or away from any source of water.
(b) Both the brain and the spinal cord are protected by bone: the brain by the bones of the skull and the spinal cord is protected by a set of ring-shaped bones called vertebrae. They are both cushioned by layers of membranes called meninges as well as a special fluid called cerebrospinal fluid. This fluid helps to protect the nerve tissue to keep it healthy, and remove waste products.
(c) Pituitary gland present in the brain is known as the master gland.

Q. List in tabular form three differences between nervous control and chemical control.

Answer.

Nervous System	Endocrine System
(*i*) Formed of a collection of neuron cells.	(*i*) Formed of a set of glands.
(*ii*) Electrochemical pulses are the mean of signal transmission.	(*ii*) Chemicals called hormones are the means of signal transmission.
(*iii*) Signal transmission is fast, but the functions are not prolonged.	(*iii*) Signal transmission is slow, but the functions are long lasting.
(*iv*) The cells are interconnected and the whole system is continuous.	(*iv*) The organs of the whole system are not physically connected yet those are discrete.
(*v*) Use the neurons to transmit the signal.	(*v*) Use the circulatory system to transmit the signal.

Q. Which organ secretes a hormone when bloo'd sugar rises in our body? Name the hormone and name one enzyme released by this organ.
Answer. 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.

Q. (a) Explain how auxins help in bending of plant stem towards light.
(b) State the objective of the experiment for which experimental set-up is shown in the given diagram.

Answer.
(a) In plant shoots, the role of auxin is to cause a positive phototropism, i.e. to grow the plant towards the light. When light is incident on a plant from one direction, it causes the auxins to redistribute towards the shaded side of the plant. One function of auxin is to cause cell elongation. The redistribution causes the cells on the shaded side to elongate more than those on the side with the light shining on them. This causes the shoot to bend towards the light.
(b) The objective of the experiment is to show phototropic movement of plant.

Q. What causes a tendril to encircle or coil around the object in contact with it is? Explain the process involved.

Answer. 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. This cause the tendril to circle around the object and thus, cling to it.

Q. Name any three endocrine glands in human body and briefly write the function of each of them.
Answer. Three endocrine glands with their function in human body are as follows:

1. **Thyroid gland :** 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 nutrients and mental ability.
2. **Adernal gland :** It secretes two hormones—adrenalin and corticoid hormones regulate blood pressure, heartbeat, breathing rate and carbohydrate metabolism.
3. **Pancreas:** It secretes two hormones—insulin and glucagon. Insulin hormone lowers the blood glucose level. Glucagon hormone increases the blood glucose level.

Q. Which part of the brain controls involuntary actions? Write the function of any two regions of it.

Answer. Hind-brain controls the involuntary actions. Cerebellum controls the coordination of body movement and posture. Medulla oblongata regulates center for swallowing, coughing, sneezing and vomiting.

Q. What is chemotropism? Give one example. Name any two plant hormones and mention their functions.

Answer. 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 an ovule during the process of fertilisation in a flower.
Two plant hormones with their functions are as follows:
Auxins promote cell elongation, root formation, cell division, respiration and other physiological processes like protein synthesis, etc.
Gibberellins stimulate stem elongation, seed germination and flowering.

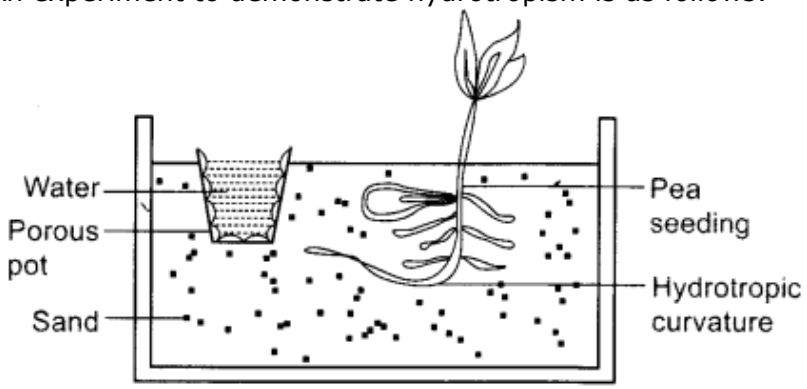
Q. State the functions of any three of the structural and functional unit of nervous system.

Answer. The structural and functional unit of nervous system, i.e. neuron with their functions are as

1. **Cell body:** Stimulus received from dendrite is changed into impulse in the cyton.
2. **Dendrites:** They receive sensation or stimulus, which may be physical or chemical.
3. **Axon:** It conducts impulse away from the cell body.

Q. What is 'hydrotropism'? Describe an experiment to demonstrate 'hydrotropism'.

Answer. 'Hydrotropism' is the directional growth of a plant part in response to water. For example, roots show hydrotropism as they grow towards water in the soil and are positively hydrotropic.
An experiment to demonstrate hydrotropism is as follows:



1. A porous pot filled with water is taken and inserted in a tub filled with dry sand.
2. A freshly germinated pea seedling is sowed in the sand.
3. As water is not available in sand, the root growing will bend towards the porous pot filled with water.
4. A hydrotropic curvature of the root is observed as it grows towards water.
5. This bending of root shows the movement in response towards water.

Q. What are 'hormones'? State one function of each of the following hormones:
(i) Thyroxine (ii) Insulin

Answer. 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.
(i) Function of Thyroxine: This hormone regulates the metabolism of carbohydrates and fats.
(ii) Function of insulin: This hormone helps in regulating sugar level in the blood.

Q. What is the function of receptors in our body? Think of situation where receptors do not work properly. What problems are likely to arise?

Answer. Receptors are present in our all parts of the body for example in skin, eye, nose tongue etc. They detect the signals and then send them to brain in the form of electrical signals. If these receptors are damaged then it they will not detect the input which leads to the harm for our body in dangerous situation.

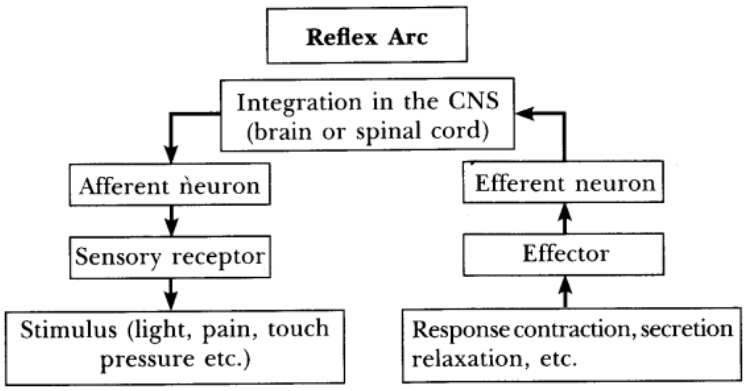
Q. What is a reflex action? Describe the steps involved in a reflex action.

Answer.
Reflex action: Jt 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:

1. Receptor organ like skin perceives the stimulus and activates a sensory nerve impulse.
2. Sensory organ carries message in the form of sensory impulse to the spinal cord.
3. The spinal cord acts as modulator : The neurons of spinal cord transmit the sensory nerve impulse to motor neuron.
4. Motor never conducts these impulses to the effectors like leg muscles which responds by pulling back the organ away from the harmful stimulus.

Q. List the components of reflex arc in correct sequence. State in brief the role of brain in reflex action.

Answer. The reflex arc pathway is shown in the flow chart as follows:
The Reflex arc does not involve brain. It minimises the overloading of brain.



Q. (a) Name the two main constituents of the Central Nervous System in human beings. (b) What is the need for a system of control and coordination in human beings?

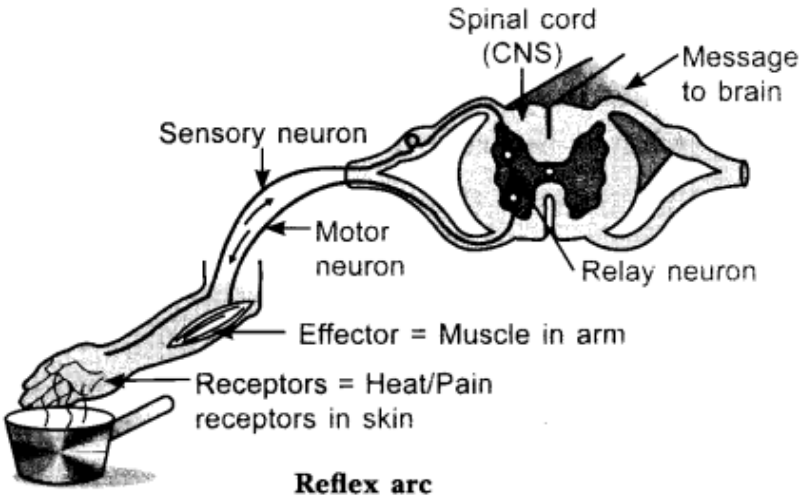
Answer. (a) The two main constituents of the Central Nervous System in human beings are the brain and the spinal cord.
(b) A living being does not live in isolation. It has to constantly interact with its external environment and has to respond properly for its survival. For example; when a hungry lion spots a deer, the lion has to quickly make a move so that it can have its food. On the other hand, the deer needs to quickly make a move to run for its life. The responses which a living being makes in relation to external stimuli are controlled and coordinated by a system; especially in complex animals. 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.

Long Answer Type Question [5 Marks]

Q. What is meant by reflex-action ? With the help of a labelled diagram trace the sequence of events which occur when we touch a hot object.

Answer. Stimulus: In the example above, the stimulus is the contact with the hot pot. This contact causes a nerve impulse that will travel to the spinal cord via the sensory neurons.
Sensory neurons: These neurons carry the nerve impulse to the spinal cord. Similar to the interneuron and motor neuron, sensory neurons receive incoming impulses at the dendrites. The impulses move away from the cell body along the axon to the synaptic terminal where the impulse is sent to the next interneuron with the help of a neurotransmitter (acetylcholine). Interneurons: The interneuron is also known as relay neuron. These neurons are fully contained in the central nervous

system. The interneuron serves as the connection between the sensory neurons and the motor neurons. Synapse: The synapse is a tiny space between two neurons. When an impulse gets to the end of one neuron and has to be sent down to the next neuron, the synapse acts as a bridge. The signal arrives at the end of one neuron (close to the synapse) as an electrical signal, crosses the synapse as a chemical signal (with the help of a neurotransmitter known as acetylcholine released by the synaptic vesicles at the synaptic terminal) and continues as an electrical signal in the next neuron.
Motor neurons: These neurons send nerve impulses away from the central nervous system to effector organs or muscle fiber in our example above. This causes the muscle fiber to contract, resulting in you snatching your hand away from the hot pot.



Reflex arc

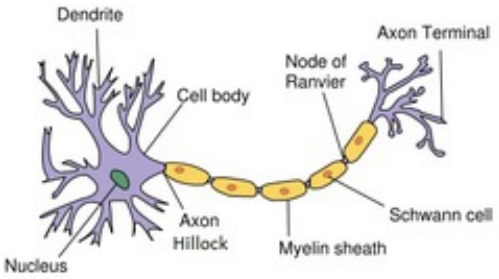
Response: To respond to the stimulus of the reflex arc, the muscle needs to contract to pull the hand quickly away from the hot pot. For this to happen, the impulse travels to the synaptic terminal of the motor neuron. Synaptic vesicles at the synaptic . terminal will then release acetylcholine which will cross the synapse and bind to the receptors on the muscle fibers to trigger the muscle contraction known as the 'response'.

Q. (a) Name the hormone which is released into the blood when its sugar level rises. Explain the need of Chemical communication in multicellular organisms the organ which produces this hormone and its effect on blood sugar level. Also mention the digestive enzymes secreted by this organ with one function of each.
(b) Explain the need of Chemical communication in multicellular organisms.

Answer.
(a) Glucose is needed by cells for respiration. It is important that the concentration of glucose in the blood is maintained at a constant level. Insulin is a hormone produced by the a-cells that regulates glucose levels in the blood.
In order for multicellular organisms to function properly, their cells must communicate. For instance, your muscles must contract when your brain sends a message to contract.
Pancreas produces insulin and p-cells which increase glucose in blood. It also – produces digestive enzyme (pancreatic amylase).
(b) Cell-to-cell signaling is a critical component of coordinating cellular activities. Through this communication, messages are carried from signaling cells to receiving cells, also known as target cells. This signaling occurs with proteins and other types of signaling molecules. Other things which happens in our body due to cell communication are – growth and development, cellular reproduction, tissue repair, sensing pain, etc.

Q. State the structural and the functional unit of the nervous system. Draw its neat labelled diagram and write two functions.

Answer. The structural and functional unit of the nervous system is the neuron.



The functions of the neuron are:
(a) Passing of information takes place-
(i) By electric impulse (inside the neuron) and
(ii) In the form of chemicals (At synapse)
(b) Reflex action- spontaneous, involuntary and automatic response to a stimulus to protect us from harmful situations. For example, on touching a hot object unknowingly we instantly withdraw our hand.