

## Short Answer Type Questions-II

**Q.1. How nerve impulses are conducted in non- myelinated nerves? [KVS Agra 2016]**

**Ans.** Transmission of nerve impulse through non-myelinated nerves:

- (i) In resting stage, the  $\text{Na}^+$  ions are pumped out from the axoplasm. It needs energy to work normally.
- (ii) Thus axon membrane is electronegative inside and electropositive outside, this is called resting potential. In this state the nerve is said to be in polarized state.
- (iii) When the nerve fibre is stimulated, it cause electrochemical disturbance in the nerve fibre, a change in potential. This change is called action potential.
- (iv) Thus,  $\text{Na}^+$  migrate into the axoplasm and  $\text{Cl}^-$  ions diffuses out. Thus negativity is increased outside and positivity is increased inside. This is called depolarisation.
- (v) Depolarisation progresses along the nerve fibre in both directions from the point of stimulus.

**Q. 2. Write short notes on hind brain. [KVS Agra 2017]**

**Ans. Hind Brain:** It consists of three regions: pons, cerebellum, and medulla oblongata.

- (i) **Pons** is band of nerve fibers that lies between medulla oblongata and midbrain. It connects the lateral parts of cerebellar hemisphere together.
- (ii) **Cerebellum** is large and well-developed part of hindbrain. It is located below the posterior sides of cerebral hemispheres and above the medulla oblongata. It is responsible for maintaining posture and equilibrium of the body.
- (iii) **Medulla oblongata** is the posterior and simplest part of the brain. It is located beneath the cerebellum. Its lower end extends in the form of spinal cord and leaves the skull through foramen magnum.

**Q.3. How are neurons classified based on the number of axons and dentrites? [KVS Silchar 2017]**

**Ans.** The structural classification of neurons depends upon the number of dendrites extending from the cell body.

- (i) Multipolar neurons have one axon and several dendrites; the majority of neurons in the spinal cord and brain are multipolar.
- (ii) Bipolar neurons have only two processes: a single dendrite and an axon. Biopolar neurons are found in the sense organs-and in the retina of the eye and in olfactory cells.
- (iii) Unipolar neurons lack dendrites and have a single axon, and are also sensory neurons.

**Q. 4. What are the different parts of fore brain?**

**Ans. Fore brain (Prosencephalon):**

**(i) Olfactory lobes:** Each lobe consists of two parts, an anterior olfactory bulb and a posterior olfactory tract. They are fully covered by the cerebral hemispheres.

**(ii) Cerebrum :** The cerebrum is the largest part of the human brain. It consists of left and right hemispheres connected by a large bundle of myelinated fiber's, the corpus callosum and other smaller fibre bundles. The outer portion of cerebrum is called the cerebral cortex that makes up the grey matter of the cerebrum. There are three kinds of cortex: sensory, motor and associative. Beneath the grey matter, the large concentration of medullated nerve fiber's gives this tissue an opaque white appearance, collectively called white matter. Each cerebral hemisphere is divided into four lobes : frontal, parietal, temporal and occipital lobe.

**(iii) Diencephalon :** Its main parts are epithalamus, thalamus and hypothalamus. Epithalamus is thin and not formed of nervous tissue. Hypothalamus is relatively small but is highly vascular. The thalamus lies superior to mid brain is composed primarily of grey matter.

#### **Q.5. What are the basic functions of nervous system?**

**Ans. The nervous system of higher animals performs three basic functions:**

- (i)** They receive sensory input from internal and external environment by nerves.
- (ii)** They process the input information; and
- (iii)** They respond to the stimuli transmitting motor commands to determine the response of the body parts or cells.

#### **Q. 6. In how many parts human nervous system is divided?**

**Ans.** Human nervous system is divisible into three main parts:

- (i) Central Nervous System:** It is a hollow, dorsally placed structure lying along the mid-dorsal axis of the body. It comprises the brain and spinal cord.
- (ii) Peripheral Nervous System:** The nerves arising from the central nervous system constitute the peripheral nervous system. The nerves originate from the brain and spinal cord and are known as cranial nerves and spinal nerves respectively.
- (iii) Autonomic Nervous System:** It controls and co-ordinates organs which are under involuntary control. It consists of sympathetic and parasympathetic nervous system.

#### **Q.7. Distinguish between the following pairs:**

- (i) Afferent neurons and Efferent neurons.**
- (ii) Mixed and motor nerves**
- (iii) Dorsal and ventral spinal roots.**

**Ans. (i)**

<b>S. No</b>	<b>Afferent neuron</b>	<b>Efferent neuron</b>
<b>(i)</b>	They conduct impulses from the receptors to the CNS	They conduct impulses from CNS to the effectors.
<b>(ii)</b>	They are sensory in nature.	They are motor in nature.

(ii)

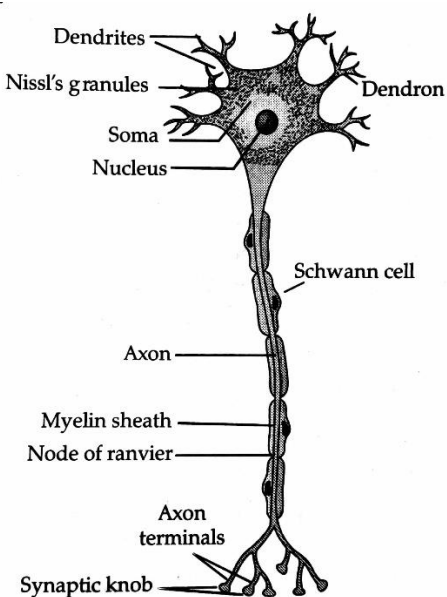
S. No	Mixed	Motor nerve
(i)	It has both motor and sensory neurons.	It has only motor neurons.
(ii)	Sensory carry impulses to CNS from receptors and simultaneously motor fibres conduct impulses from CNS to muscles and glands.	It conducts nerve impulses from CNS to some muscle or gland to control their activities.
(iii)	Arise from spinal cord.	Arise from spinal cord brain (CNS).

(iii)

S. No	Dorsal spinal roots	Ventral spinal roots
(i)	They are made of sensory (afferent) nerves.	They are made of motor (efferent) nerves.
(ii)	Their cell bodies are located in dorsal root ganglia.	The cell bodies of ventral spinal root is located in ventrolateral horn or grey mater.

**Q.8. Draw and label the structure of a neuron. [KVS Mumbai 2016]**

**Ans.**

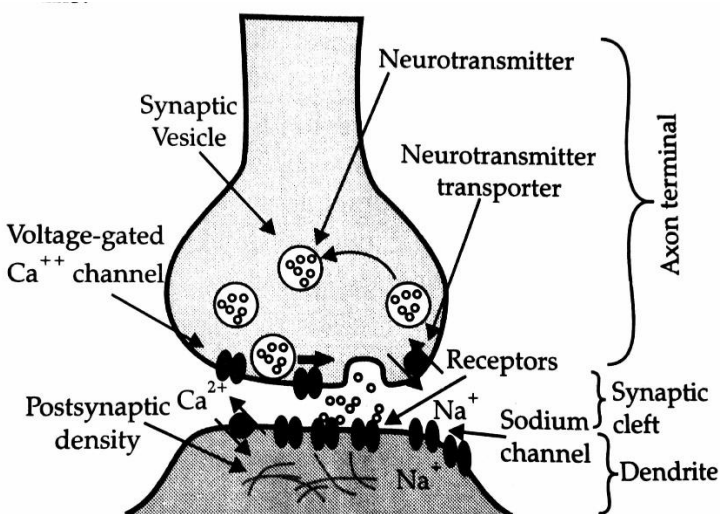


**Structure of a Neuron**

**Q.9. Draw a labelled diagram of a synapse.**

**[KVS Mumbai 2016]**

**Ans.**



**Diagram of Synapse**

**Q.10 Distinguish between:**

**(i) Motor and pre-motor area,**

**(ii) Receptor and motor end plate.**

**Ans.**

**(i)**

S. No	Myelinated Neuron	Non-myelinated Neuron
(i)	The axons are covered by lipid rich myelin sheath.	The myelin sheath is absent.
(ii)	Conduction of nerve impulse is faster and called saltatory conduction.	Conduction is comparatively slower.
(iii)	Action potential occurs only in the nodes of ranvier.	Action potential occurs along the nerve fibres.
(iv)	Myelinated nerve fibres are found in spinal cord.	Non-myelinated nerve fibre is found in autonomous and the somatic neural system.

(ii)

S. No	Receptor	Motor end Plate
(i)	It is a structure of sensory terminal.	It occurs at neuromuscular junction.
(ii)	On the nerve fibre, there are structures for collecting information which are called receptors.	The axon of a neuron ends into a muscle fibre or a gland cell.

**Q.11. Name the lobes of cerebrum and write their functions.**

**Ans. Cerebral lobes and their main functions:**

S. No	Cerebral Lobe	Major Functions
(i)	Frontal lobe	Reasoning will power, monitoring of thoughts and actions, creative ideas, translation of perceptions and memories into plans, muscle movement, reality testing by judgement, intellectual insight.
(ii)	Temporal lobe	Memory, smell, as well as emotions.
(iii)	Occipital lobe	Decoding and interpretation of visual information: colour and shape.
(iv)	Parietal lobe	Taking information from environment, organizing it and communicating it to rest part of brain, registration of sensory perception called the feelings about touch, pain, heat and cold; knowledge about position in space

**Q.12. Define nerve impulse and explain its conduction [KVS 2007, 2010, 11]**

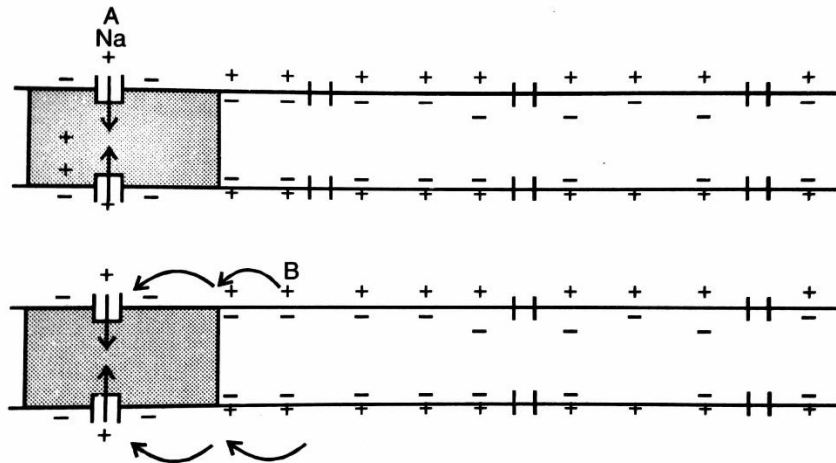
**Ans.** Nerve impulse Nerve impulse is any signal initiated by the stimulus at the receptor. Nerve cells are excitable.

**Conduction of Nerve Impulse in Non-Myelinated Nerve Fibre:** It is divided into three phases:

**(i) Resting phase:** During this phase, there is more  $Na^+$  ions on outside of axon membrane in ECF than inside of the axon membrane.  $K^+$  ions move out and the membrane is positively charged outside and negatively charged inside. Thus, membrane is in resting potential (-80 mV).

**(ii) Action Potential:** It is other name of nerve impulse with resting potential. When the stimulus is applied, the axon membrane is negatively charged outside and positively charged inside. It is called depolarized or an action potential (+30 mV). The electrogenic pump expels three  $Na^+$  for every two  $K^+$  imported.  $Na^+K^+$  ions transmembrane pumps are very important in membrane potential.

**(iii) Recovery Phase:** During this phase depolarized point becomes repolarized and  $Na^+$  ions move to outside while  $K^+$  ions move inside.



**Fig. Showing impulse conduction through an axon**

**Q.13. What do you call the conduction of impulse along a myelinated nerve fibre? [KV 2007, KV 2008]**

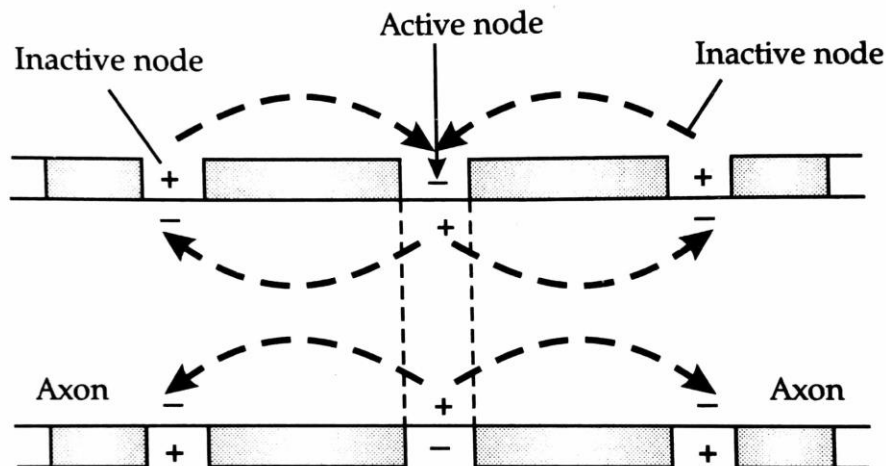
**OR**

**Why is the mode of conduction of electrical impulse along the myelinated neuron is advantageous to a non-myelinated neuron?**

**What is this type of conduction called?**

**Ans. (i)** Along a myelinated nerve fibre, the conduction of impulse is called saltatory conduction.

**(ii)** This is so because the ionic changes and consequent depolarization takes place only at the nodes of Ranvier free from myelin sheath leading to the jumping of action potential from one node to the next.



**Fig. Saltatory conduction**

**Q.14. How nerve fibres gets terminated?**

**Ans.** Nerve fibres terminate in three ways:

- (i) The axon of one neuron ends on the dendrites of the next neuron. Such a junction is called synapse.
- (ii) The axon of a neuron terminates on either a muscle fibre, or a gland cell. When it ends on a muscle fibre, it forms the neuromotor junction. The contact between a neuron and glandular cells is called neuroglandular junction.
- (iii) Many nerve fibres, for example in the skin, divides into fine branches known as the sensory nerve endings.

**Q.15.What are the main properties of nervous tissue?**

**Ans.** The nervous tissue has two outstanding properties excitability and conductivity.

**(i) Excitability:** It is the ability of the nerve cells and fibres to enter into an active state called the state of excitation in response to a stimulus. Excitation arises at the receptors on account of various stimuli such as light, temperature, chemical, electrical or pressure which constantly act on the organisms.

**(ii) Conductivity:** The excitation does not remain at the site of its origin. It is transmitted along nerve fibres. The transmission of excitation in a particular direction is called conductivity

**Q.16. What are the functions of Hypothalamus?**

**Ans. (i)** Hypothalamus integrates and controls the visceral activities.

**(ii)** It maintains homeostasis.

**(iii)** It provides anatomical connection between the nervous and endocrine systems by its relationship to the pituitary gland.

**(iv)** Hypothalamus is thermoregulatory centre. Hence it is called "thermostat" of the body. It keeps body temperature at roughly 37°C by means of a complex thermostat system.

**(v)** It is also associated with behavioural activities.

**(vi)** Appetite and thirst centres are located in the hypothalamus.

**Q. 17. What is the difference between unipolar, bipolar and multipolar neurons? Give one example of each.**

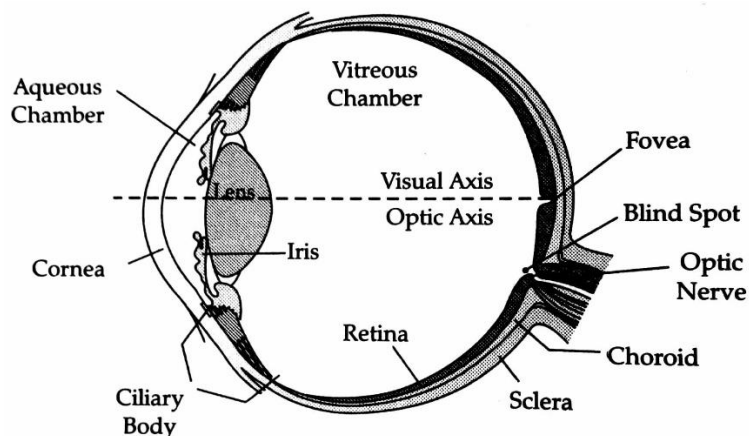
**Ans.**

Unipolar neurons	Bipolar neurons	Multipolar neurons
Unipolar neu-ron has only one axon.	Bipolar neuron has one axon and one dendrite.	Multipolar neu-ron has one axon and many den-drites.

E.g., found in the ganglia in brain and spinal cord.	E.g., found in the sense organs.	E.g., found in the central neurons system.
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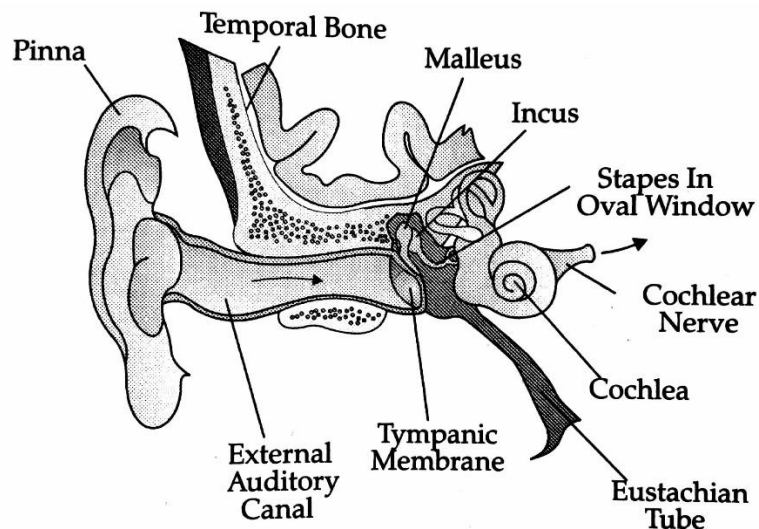
**Q.18. Draw a labelled diagram of human eye and label various parts. [KVS Guwahati 2016]**

**Ans. Labelled diagram of human eye**



**Q.19. Draw a sketch of human ear and label various parts. [KVS Guwahati 2016]**

**Ans. Labelled diagram of human ear**



**Q 20. Discuss the role of middle ear in hearing. [DDE 2017]**

**Ans. Middle ear:** The middle ear contains three ossicles called malleus, incus and stapes which are attached to one another in a chain-like fashion. The malleus is attached to the

tympanic membrane and the stapes is attached to the oval window of the cochlea. The ear ossicles increase the efficiency of transmission of sound waves to the inner ear. Eustachian tube help in equalising the pressure of either side of ear drum.

**Q. 21. Name the two humours found inside the mammalian eye. List the functions they perform.**

**Ans.** Aqueous humour and vitreous humour.

**Functions of aqueous humour:**

- (i) Gives nutrition to non-vascular lens and cornea;
- (ii) Helps in inflating eye ball and gives shape to the eye;
- (iii) Supports the lens; and
- (iv) Refract the light rays to focus on retina. **(Any three)**

**Functions of vitreous humour:**

- (i) Helps in maintaining shape of the eye;
- (ii) Supports retina and lens; and
- (iii) Refracts the light rays.

**Q.22. What is a reflex arc? And how many parts does it consists of?**

**Ans.** The path travelled by an impulse in a reflex action is called the reflex arc. It consists of five parts:

- (i)** A receptor or skin, the neurons of which start a sensory impulse.
- (ii)** An afferent nerve, which brings sensory impulse from the receptor to the central nervous system.
- (iii)** The neurons present in the spinal cord change the sensory impulse into the motor impulse.
- (iv)** An efferent nerve, which carries the motor impulses from the spinal cord to the specific effectors like muscles fibres or gland cells.
- (v)** An effector, where impulse terminates and response is given.

**Q. 23. What is meant by 'reflex action'? Give one example. Name the components of a reflex arc in proper sequence from the receptor upto the effector.**

**Ans. Reflex Action:** It is an involuntary, spontaneous nerve mediated action produced at unconscious level by stimulating specific receptors. Reflex action is rapid and automatic response. *E.g.*, peristalsis, respiration, watering in mouth etc.

**Components of a Reflex Arc:** It includes

- (i)** receptors,
- (ii)** afferent sensory neuron,
- (iii)** spinal cord/ganglion,

- (iv) efferent motor neuron and
- (v) the effector muscle or gland.

Receptor → Afferent sensory neuron → Interneuron → Efferent motor neuron → Effector muscle/gland.

**Q.24. Explain the mechanism of reflex action. [NCT-2007]**

**Ans. (i)** Reflex action is a form of animal behavior in which the stimulation of a sensory organ (receptor) results in the activity of some organ without the intervention of will.

**(ii)** For a reflex action five things are normally essential:

- (a) receptor,
- (b) sensory nerve fibres,
- (c) a part of the central nervous system,
- (d) motor nerve fibres and
- (e) effector organ such as muscles and glands.

**(iii)** The sensory nerve fibres bring sensory impulses from the receptor organ to the central nervous system.

**(iv)** The motor nerve fibres relay the motor impulses from the central nervous system to the effector organs.

**Q.25. Why does your mouth usually waters at the sight of tasty food? Give some other examples also.**

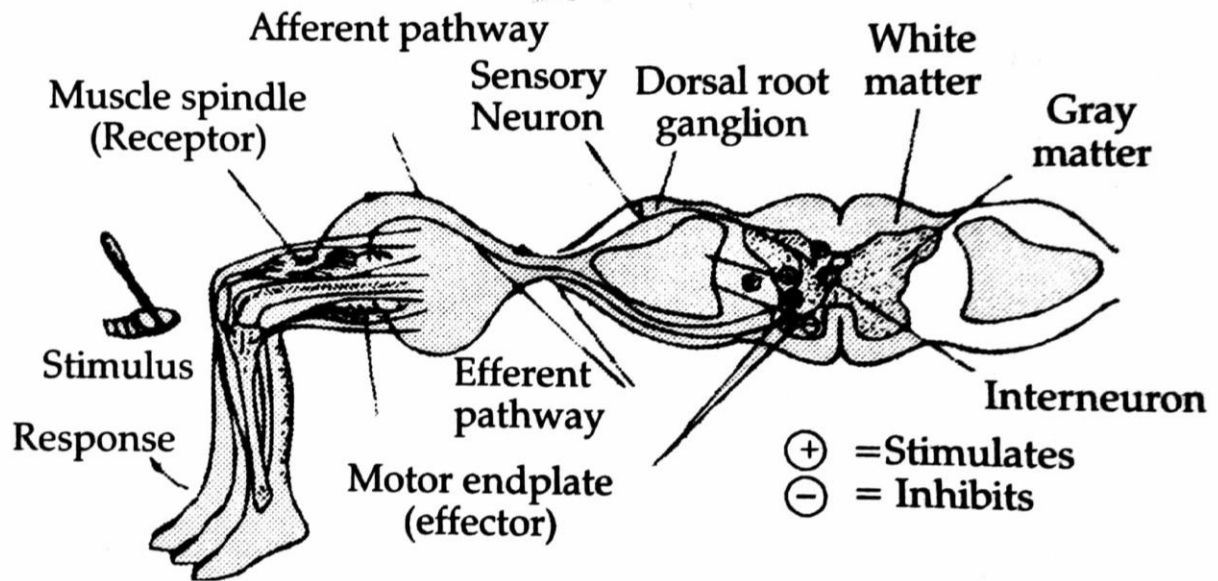
**Ans.** It is due to the reflex action. Reflex is “an involuntary action performed by muscles under the direction of spinal cord in response to the stimulus”. In short, reflex actions are automatic responses to stimulus. They are of definite and mechanical type.

**Some other example of reflex action:**

- (i) Narrowing of the pupil of the eye when strong light falls upon it.
- (ii) When a hot object is touched accidentally by our hand, it is withdrawn at once.
- (iii) Flow of bile from the gall bladder into the duodenum.
- (iv) Opening of mouth on hearing a loud sound.

**Q.26. Draw a labelled diagram of reflex arc that operates when a person responds in case of knee jerk. [NCT-2011]**

**Ans.**



**Fig. Reflex arc**  
**(1 for labelling + 2 for diagram)**