I. Objective Question:

1. Medulla oblongata controls

A. Smelling
B. Beating of heart and respiratory movement
C. Intelligence and will power
D. Balancing the body

Answer: Beating of heart and respiratory movement

Reason — Medulla oblongata controls breathing, heart function, blood vessel function, digestion, sneezing, and peristalsis of the alimentary canal, etc

2. Balance of body is controlled by:

A. Spinal cord
B. Cerebellum
C. Cerebrum
D. Medulla

Answer: Cerebellum

Reason — Body balance and muscular coordination is controlled by the cerebellum of the brain.

3. The smell of good food causes watering of your mouth. It is a

A. Natural reflex
B. Acquired reflex
C. Inborn reflex
D. Ordinary reflex

Answer: Acquired reflex

Reason — Salivation on smelling good food is an acquired reflex that occurs because our brain remembers the taste of the food due to a previous experience.

4. The structural and functional unit of the nervous system is a

A. Axon
B. Nephron
C. Neuron
D. Texon

Answer: Nephron

Reason — Neurons are the structural and functional unit of the nervous system

5. Many short fibres extending from the cell body of a nerve cell are called

A. dendrons
B. axon
C. dendrites
D. ganglia

Answer: dendrons

Reason — many short fibres called dendrons arise from the cell body. They further divide to form dendrites.

6. Motor nerve carries messages to the

A. heart
B. spinal cord
C. muscles and glands
D. brain

Answer: muscles and glands

Reason — Motor nerves carry messages from brain or spinal cord to the muscles and glands of the body.

7. These nerves emerge from the brain and reach organs in the head region.

A. Spinal
B. Cranial
C. C.vagus
D. pelvic

Answer: cranial

Reason — Cranial nerves emerge from the brain and reach organs in the head region.

8. The message that travels along a nerve in the form of a wave of chemical disturbance is called

1. stimulus
2. response
3. sensation
4. impulse

Answer: impulse

Reason — Messages travel along the nerve cells in the form of a wave of chemical disturbance called an impulse. An impulse is like an electrical signal.

9. Junction of the two neurons is called

A. joint

B. synapse

C. association neuron

D. synaptic button

Answer: synapse

Reason — A synapse is a junction where communication between two neurons occurs.

10. The human brain is enveloped by three membranes called

A. impulses

B. meninges

C. synapses

D. none of these

Answer: meninges

Reason — The human brain is enveloped by three membranes called meninges.

11. Breathing and heartbeat are controlled by the

A. cerebellum

B. cerebrum

C. medulla

D. nerve cells

Answer: medulla

Reason — The medulla oblongata controls involuntary actions of the body like breathing, heartbeat, coughing, sneezing, etc.

12. The central canal of the spinal cord is surrounded by an H-shaped area called

A. grey matter

B. white matter

C. black matter

D. silver matter

Answer: grey matter

Reason — The central canal of the spinal cord is surrounded by an H-shaped area called grey matter.

13. Reflex actions are the actions controlled by

A. brain

B. spinal cord

C. both brain and spinal cord

D. neither brain nor spinal cord

Answer: spinal cord

Reason — Reflex actions are the actions controlled by spinal cord.

14. The peripheral nervous system transmits messages to and from the sense organs and is responsible for

A. involuntary actions

B. reflex actions

C. autonomic actions

D. voluntary actions

Answer: voluntary actions

Reason — Peripheral nervous system is responsible for voluntary actions such as cycling, swimming, etc.

B. Fill in the Blanks:

Q1: A neuron is the basic structural and functional unit of the_____system.

Answer: A neuron is the basic structural and functional unit of the **nervous** system.

Q2: A single long fibre extending from the cell body of a neuron is called_____.

Answer: A single long fibre extending from the cell body of a neuron is called **axon**.

Q3: The central nervous system consists of _____ and _____ .

Answer: The central nervous system consists of ***brain*** and ***spinal cord*.**

Q4: The ..... is the continuation of the medulla oblongata of the brain.

Answer: The ***spinal cord*** is the continuation of the medulla oblongata of the brain.

Q5: The nerve pathway of a reflex action is called a _____.

Answer: The nerve pathway of a reflex action is called a ***reflex arc***.

Q6: The peripheral nervous system consists of _____ and _____ nerves.

Answer: The peripheral nervous system consists of ***cranial*** and ***spinal*** nerves.

Q7: The basic structural and functional unit of the nervous system is a _____ .

Answer: The basic structural and functional unit of the nervous system is a **nerve cell or neuron**.

Q8._____ is covered by a sheath called myelin sheath.

Answer: *Axon* is covered by a sheath called myelin sheath.

Q9_____ is the largest part of the brain.

Answer: ***Cerebrum*** is the largest part of the brain.

Q10. The _____ fluid nourishes the brain and absorbs shocks.

Answer: The *Cerebrospinal* fluid nourishes the brain and absorbs shocks.

Q11. The _____. coordinates the movement of the voluntary muscles.

Answer: The ***Cerebellum*** coordinates the movement of the voluntary muscles.

C. True or False. If False, correct the following statements:

Q1: Each nerve cell consists of a cell body, many short fibres and a long fibre.

Answer: True

Q2: Motor nerves carry impulses from the sense organs to the spinal cord.

Answer: False

Corrected statement — Motor nerves carry impulses from the spinal cord to the sense organs.

Q3: The largest portion of the brain is the cerebellum.

Answer: False

Corrected statement — The largest portion of the brain is the cerebrum.

Q4: Thinking, reasoning and memory are controlled by the medulla.

Answer: False

Corrected statement — Thinking, reasoning and memory are controlled by the cerebrum.

Q5. A reflex action is a spontaneous response to a stimulus.

Answer: True

Q6: The central nervous system consists of nerves only.

Answer: False

Corrected statement — The central nervous system consists of brain and spinal cord.

D. Find the odd one out. Give reason for your choice:

Q1. Dendron , cyton , cerebrum, dendrite, axon

Answer: cerebrum

Reason — cerebrum is part of brain while Dendron , cyton , dendrite and axon are parts of neuron cell.

Q2. Cerebrum, cerebellum, medulla oblongata, dendrite

Answer: dendrite

Reason — cerebrum, cerebellum and medulla oblongata are parts of brain but dendrite is part of neuron

E. Write one word in the space provided to complete the second pair of the related words pertaining to the nervous system.

Memory: cerebrum:: breathing: ?

Balance: cerebellum:: reasoning: ?

Solution:

Memory: cerebrum:: breathing: medulla oblongata

Function of cerebrum is to store memory and breathing function is controlled by the medulla oblongata.

Balance: cerebellum:: reasoning: cerebrum

Cerebellum function is to maintain the balance of the body and cerebrum is the main center for reasoning and analytical thinking.

F. Name the following :

(a) The long, extended process of a neuron

(b) The point of contact between two neurons

(c) The kind of nerve which carries both sensory and motor neurons

(d) The nerve which connects the eyes to the brain

(e) The nerve which connects the nose to the brain

(f) The nerve which connects the ears to the brain

(g) Two sub-divisions of the peripheral nervous system

(h) Two parts of the autonomic nervous system

Answer

(a) Axon

(b) Synapse

(c) Mixed nerve

(d) The Optic nerve

(e) Olfactory nerve

(f) Auditory nerve

(g) Somatic nervous system and Autonomic nervous system.

(h) Sympathetic and Parasympathetic systems

II. Short Answer Questions:

Q1. Name the two types of coordination which take place in our body.

Solution:

(a) Nervous coordination: By nerves and brain

(b) Chemical coordination: By hormones

Q2.(a) Name the three major divisions of the human nervous system.

Solution:

1. The peripheral nervous system

2. The central nervous system

3. The autonomic nervous system

(b) Name the three main parts of the human brain.

Solution:

1. Cerebrum

2. Cerebellum

3. Medulla oblongata

Q3. Mention the three functions of spinal cord.

Answer

Spinal cord has the following functions —

1. To control reflexes below the neck.
2. To conduct messages from the skin and muscles to the brain.
3. To conduct commands from the brain to muscles of the trunk (or torso) and limbs.

Q4. You are driving your bicycle at a fast speed. Suddenly, a small boy comes in front of your cycle and without wasting any time in thinking, you immediately apply the brakes and the accident is avoided. What name is given to such an action ?

Answer: This is a Conditioned or Acquired Reflex action. This reflex is one which is developed during the lifetime due to experience or learning.

Q5. Define nervous system.

Answer: The organ system in our body that brings about coordination and integration of different body activities is called the nervous system.

Q6. What are motor nerves?

Answer: The nerves that carry messages in the form of responses from the brain or spinal cord to other parts of the body such as muscles and glands are called motor nerves. They contain only motor fibres. For example, nerves arising from the brain leading to muscles of the eye balls are motor nerves.

Q7. What is a synapse?

Answer: A synapse is a junction where communication between two neurons occurs.

Q8. Write the function of the cerebrospinal fluid.

Answer: The functions of the cerebrospinal fluid are:

1. It nourishes the brain.
2. It protects the brain from shocks by absorbing them.

Q9. Give two examples of reflex actions.

Answer: Two examples of reflex actions are:

1. Blinking of eyes when a foreign particle enters the eye.
2. Immediate withdrawal of hand if you unknowingly touch a hot object.

Q10. When you smell tasty food, your mouth waters. Which part of the nervous system makes this happen?

Answer: The watering of mouth with smell of tasty food is a conditioned reflex. Thus, Spinal cord is involved in it.

Q11. Rakesh was walking barefoot in a park. Suddenly, he stepped on a nail and withdrew his foot spontaneously. Name the pathway involved in this action. Which organ in our body controls such actions?

Answer: Below flowchart shows the reflex arc pathway involved in the action. The organ that controls such action is **spinal cord**.

Q12. What is Central Nervous System?

Answer: The Central Nervous System is the nerve network in the body that helps to regulate nearly every function of the body. The Central Nervous System is made of the brain & the spinal cord. Also, there are millions of nerves are present that regulate the function of the body.

Q13. What are the four lobes of the brain?

Answer: There are four lobes in the brain. They are termed the Temporal Lobe, Occipital Lobe, Parietal Lobe & Frontal Lobe. They all have the necessary significance in controlling the operations of the brain. They all are involved in the Central Nervous System communication process.

Q14. How many cranial nerves are coming out from the brain?

Answer::There are 12 pairs of cranial nerves are present in the body. All these nerves are coming out from the brain using some holes in the skull. This helps to regulate the function of certain organs.

Q15. How many spinal nerves are coming from the spinal cord?

Answer:
There are 31 pairs of spinal nerves are present in the body. All these nerves are coming out from the spinal cord & coming to be merged with the Peripheral Nervous System. This help to regulate the function of the motor neurons.

Q16:.Which part of the Central Nervous System is responsible for the reflex action?

Answer: The spinal cord is responsible for the reflex action in the body. Reflex action is a certain action provided by the body without getting any command from the Central Nervous System. The brain is not the controller of the reflex action. Rather the spinal cord helps to do that.

Q17. Mention the three functions of spinal cord.

Answer: Spinal cord has the following functions.

1. It is the centre of reflex actions below the neck.
2. It carries messages from the skin and muscles to the brain.
3. All the stimuli and responses are passed from and to the brain through the spinal cord.

Q18. What constitutes the central and peripheral nervous systems?

Answer: The central nervous system is composed of the brain and the spinal cord.

The peripheral nervous system is composed of cranial nerves, spinal nerves and the autonomous nervous system.

III. Long Answer Questions:

Q1. Differentiate between Sensory and Motor Neuron.
Answer:

Differentiating Property	Sensory Neuron	Motor Neuron
Definition	Sensory neurons are nerve cells that are responsible for converting external stimuli into internal electrical impulses.	Motor neuron is a nerve cell whose cell body is located in the spinal cord and axon fiber projects outside of the spinal cord. It directly or indirectly controls effector organs like muscles and glands.
Axon	Sensory neurons consist of a short axon.	Motor neurons consist of a long axon.
Receptor	Sensory neurons consist of a receptor.	Motor neurons do not consist of a receptor.
Cell Body	Cell body of the sensory neuron is situated in the dorsal root ganglion of the spinal cord, and no dendrites are found in it.	Cell body of the motor neuron situated in the ventral root ganglion of the spinal cord and consists of dendrites.
Dendrons	Sensory neuron consists of one long dendron.	Motor neuron consists of many short dendrons.
Function	Sensory neurons carry signals from the outer part of the body into the central nervous system.	Motor neurons carry signals from the central nervous system to the outer parts of the body
Afferent/Efferent Pathways	Sensory neurons follow the afferent pathway.	Motor neurons follow the efferent pathway.
Number	An adult has around 10million sensory neurons in the body.	Around half million of motor neurons are found in the body.
Multipolar/Unipolar	Sensory neurons are unipolar.	Motor neurons are multipolar.
Found in	Sensory neurons are found in skin, eyes, ears, tongue, and nose.	Motor neurons are mainly found in muscles and glands.
Location	Sensory Neurons had placed in the dorsal ganglia of the spinal cord of an individual.	Motor Neurons had located in the spinal cord that connects with the nervous system.
Commands	Sensory Neurons controls the cells help to find the senses in the spinal cord.	Motor Neurons control the muscles, organs, glands

Q2. Give the function of each of the following:

(a) Olfactory nerve:

(b) Optic nerve:

(C) Facial nerve:

Solution:

(a) Olfactory nerve: The epithelial layers of the nasal chambers has a sense of smell. The sense of smell is carried to the brain by the olfactory nerve. They arise from the anterior ends of the olfactory lobes and are distributed to the lining of nasal chambers.

(b) Optic nerve: optic nerves carries the reflection of the object from the retina to the brain. The image formed on the retina is in a reverted position and the correct picture is formed in the brain as the object is. The optic nerves arise from the side of the diencephalon. They innervate the retina of the eve and are sensory in nature.

(c) Facial nerve: Message and all expressions of the face, mastication work alone by the teeth, movement of the neck and the activities of the salivary glands to the brain are carried by the facial nerve. It arises from the side of the medulla. On the whole facial nerves are mixed in nature.

Q3. Differentiate between natural reflex and conditioned reflex. Give examples to illustrate your answer.

Answer: **Natural reflex:** It is one in which no previous experience or learning is required. These reflexes are inborn i.e. inherited from the parents.

Examples are

1. Blinking, coughing, sneezing as these are protective reflexes
2. Salivation, swallowing, peristalsis as it provides functional efficiency.
3. Dilation of the eyes pupil to look in the dark and vice versa. It is muscular movement.
4. Pushing along of swallowed food through the food canal. It is muscular movement.

Conditioned Reflex: It is one which develops during lifetime due to experience or learning.

Examples are:

1. Watering of mouth (Salvination) at the sight of a tasty food.
2. Surfing the channels while watching the television.
3. Typing of a keyboard of a computer.
4. Playing a musical instrument.

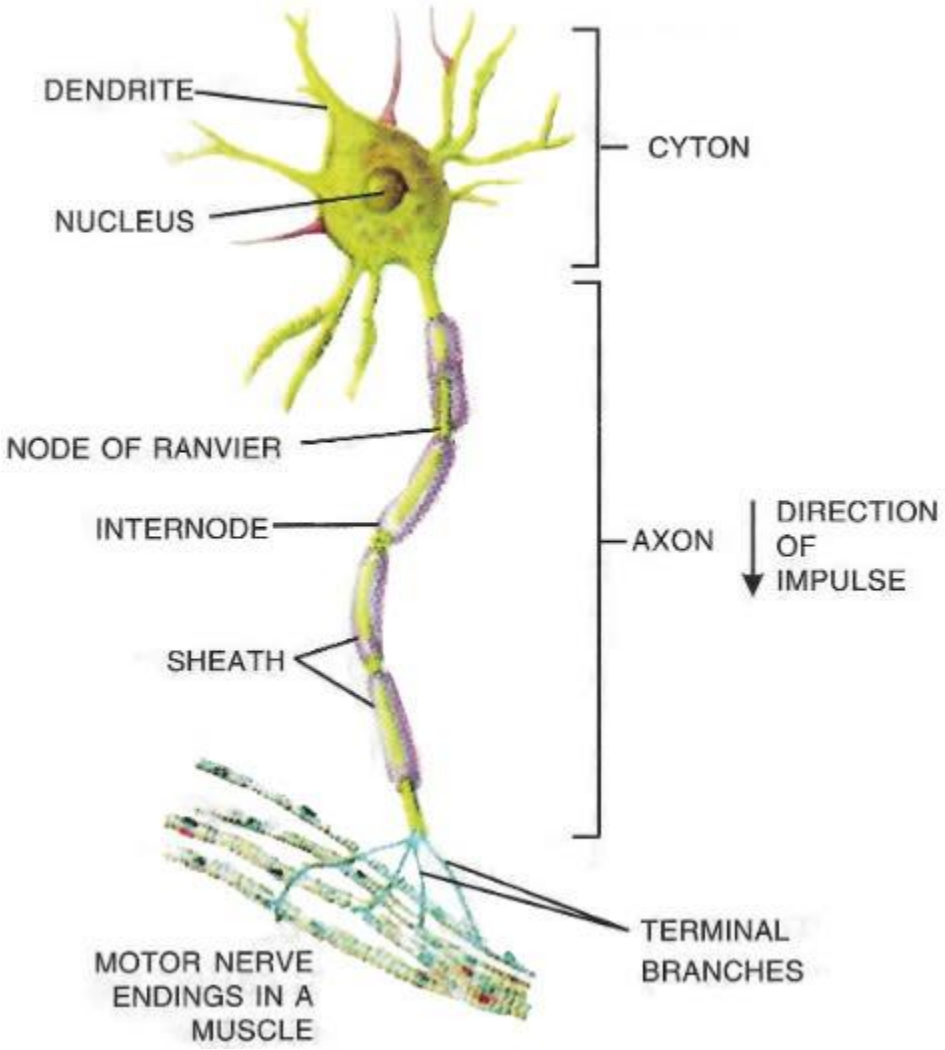
Q4. With the help of a suitable diagram, describe the structure and function of a neuron.

Answer

A neuron is made up of two main parts —

1. A main cell body called **Cyton**
2. A long process called **Axon**

The cell body contains a nucleus. The dendrites are cytoplasmic extensions of the cell body. From the cell body arises one long process called the axon. Its length may vary from a few millimetres to 1 metre. The end of the axon terminates in a number of branched filaments called terminal branches.



The function of a neuron is to receive messages (impulses) from the organs and transmit them through the cell body into the axon which transmits the message. Message is relayed from one neuron to the other through the synapse which is a small junction used for communication between two neurons.

Q5. Briefly describe the structure of the cerebellum in human brain and mention its functions .

Answer

Cerebellum is much smaller compared to Cerebrum and is located under the cerebrum. Its function is to balance the body and coordinate muscular activities. The cerebrum decides an action, whereas the cerebellum implements the action. For example, if we get an idea to stand up and walk, it arises in the cerebrum, but the muscles involved in this process contract or relax under the control of the cerebellum.

Q6. Distinguish between motor, sensory and mixed nerves with respect to their functions.

Answer:

Motor nerves	Sensory nerves	Mixed nerves
It carries messages in the form of responses from the brain or spinal cord to other parts of the body such as muscles and glands.	It carries messages (impulses) from the sense organs to either the spinal cord or the brain.	It performs the function of both motor and sensory nerves. They transmit electrical impulses from the central nervous system to the muscles of the body.

Q7. Describe the human central nervous system along with its parts and functions.

Answer

The central nervous system consists of the brain and the spinal cord. It is the control centre for all body functions. It is the site for all information processing in the body. It is responsible for processing every sensation and thought a human being experiences. It has two parts — Brain and Spinal Cord.

1. **Brain** — The Brain is the main control centre of the nervous system situated in the cranium of the skull. It controls our thinking, feelings, movement and senses. It has three parts — Cerebrum, Cerebellum and Medulla oblongata.
    i. **Cerebrum** — The cerebrum is the uppermost, largest and the most prominent part of the brain. It is responsible for the sensation of pain, temperature, touch, sight, sound, taste and smell. It also controls mental activities such as memory, intelligence, thinking and reasoning.
    ii. **Cerebellum** — The cerebellum is a small, egg-shaped lobe located at the base under the cerebrum. It helps in the muscle coordination and balance of the body.
    iii. **Medulla oblongata** — The Medulla oblongata is the lowermost part of the brain located at the base of the skull. It controls breathing, heartbeat, coughing, sneezing and other involuntary functions.
2. **Spinal cord** — The spinal cord is the continuation of the medulla oblongata of the brain. It is like a cord that emerges from a hole at the base of the skull and runs through the vertebral column. The spinal cord conducts reflexes below the neck. It conducts sensory impulses from the skin and muscles to the brain. It conducts motor responses from the brain to the muscles of the trunk and limbs.

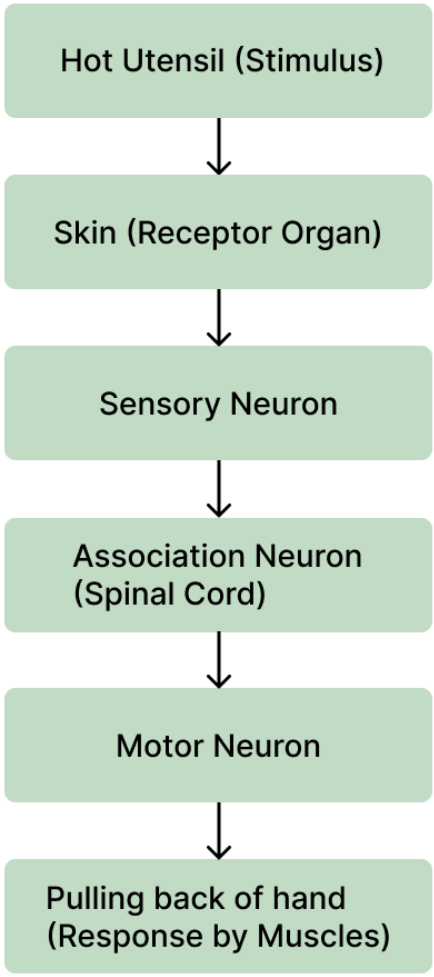
Q8. What is reflex action? Explain the reflex arc with the help of an example.

Answer: An automatic, spontaneous and mechanical response to a stimulus controlled by the spinal cord without the involvement of the brain is called a reflex action.

The path that an impulse takes in a reflex action is called a reflex arc. The reflex arc involves three neurons — sensory neurons, association neurons and motor neurons.

- If we touch a hot object, a stimulus triggers an impulse in a receptor on the skin.
- The impulse then travels from the receptor through a sensory neuron to the spinal cord.
- In the spinal cord, it passes through an association neuron to a motor neuron and finally reaches the muscles.
- The muscles of the effector organ contract moving it away from the hot object.

Below flow chart shows a simple reflex action of immediate withdrawal of hand on touching a hot object:



Q9. Differentiate between Central Nervous System and peripheral Nervous System.

Answer: Nervous system:

The nervous system comprises two parts: the central nervous system and the peripheral nervous system.

The difference between the peripheral and central nervous systems are-

Peripheral Nervous System	Central Nervous System
The peripheral nervous system comprises the sensory receptors, ganglia, and nerves.	The central nervous system comprises the brain and the spinal cord.
The function of the peripheral nervous system is to transmit sensory impulses to the central nervous system and motor impulses to the effector organs.	The major function of the central nervous system is to organize and process information obtained from sensory organs.
Damage to the peripheral nervous system would affect a local region of the body.	Damage to the central nervous system would affect the entire body.
The peripheral nervous system arises from the CNS and runs laterally throughout the body.	The central nervous system runs along the axis of the body.

Q10. Differentiate between the following pairs of terms on the basis of what is indicated within the brackets :

(a) Stimulus and response (definition)

(b) Receptor and effector (examples)

(c) Motor nerve and sensory nerve (function)

(d) Cranial and spinal nerves (number in pairs)

(e) Cerebrum and medulla oblongata (function)

(f) Cerebrum and spinal cord (arrangement of white and grey matter)

Answer

(a) Difference between Stimulus and Response (definition)

Stimulus	Response
Any change in the environment that usually results in change in the activity of the body.	The activity of the body due to the stimulus.

(b) Difference between Receptor and Effector (examples)

Receptor	Effector
The nerve cells in the skin that receives the stimulus is the receptor.	The muscle of the hand receiving the command from the brain is an effector.

(c) Difference between Motor nerve and Sensory nerve (function)

Motor Nerve	Sensory Nerve
Motor nerve carries impulses from the brain and spinal cord to the muscles and glands.	Sensory nerve carries impulses from the sense organs to the spinal cord or brain.

(d) Difference between Cranial and Spinal nerves (number in pairs)

Cranial Nerves	Spinal Nerves
There are 12 pairs of cranial nerves.	There are 31 pairs of spinal nerves.

(e) Difference between Cerebrum and Medulla oblongata (function)

Cerebrum	Medulla oblongata
The cerebrum is the seat of intelligence, consciousness and will power. It controls all the voluntary activities.	Medulla oblongata controls the activities of the internal organs.

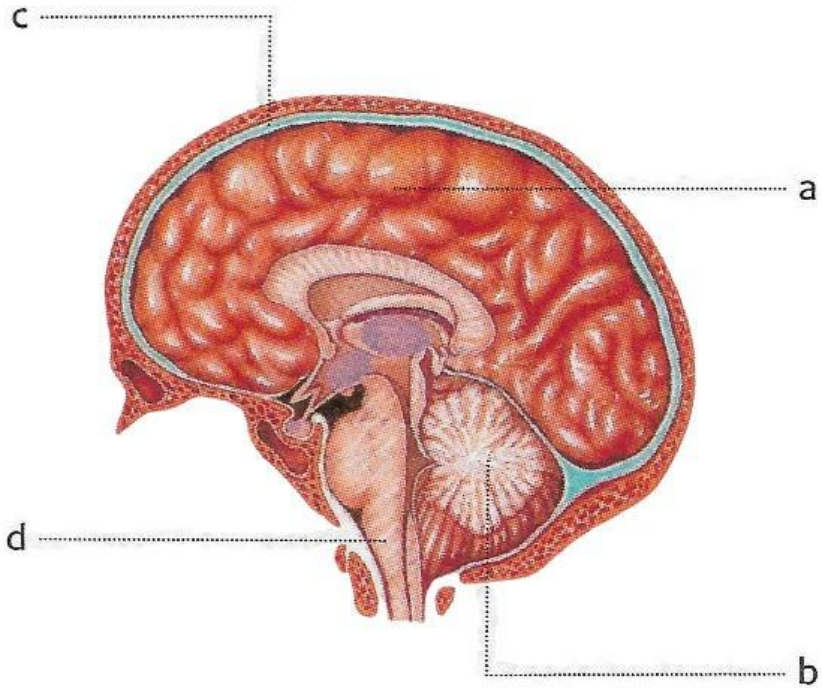
(f) Difference between Cerebrum and Spinal cord (arrangement of white and grey matter)

Cerebrum	Spinal cord
In Cerebrum, the outer portion contains grey matter and inner portion contains white matter.	In Spinal cord, the inner part contains grey matter and the outer part contains white matter.

IV. Picture Study:

Q1: The diagram represents the external view of the human brain. Study it and then answer the questions that follow.

1. Name the parts numbered a to d.
2. What is the main function of the parts numbered c and d?



Answer

1. The parts numbered a to d are:
   a → Cerebrum
   b → Cerebellum
   c → Meninges
   d → Medulla oblongata

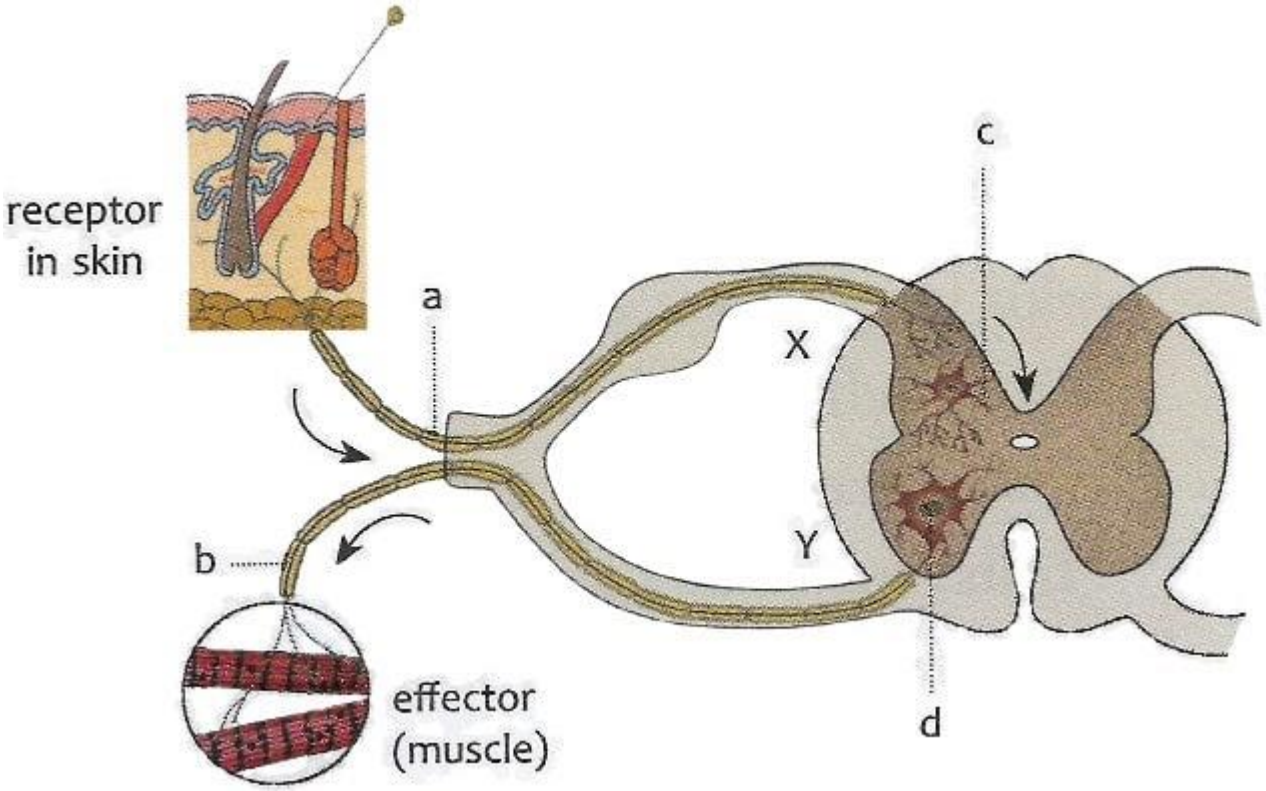
2. The main function of the parts numbered c and d are:

i. Function of Meninges (Part C) — They act as protective covering of brain with cerebrospinal fluid between them. They protect the brain from shock.

ii. Function of Medulla oblongata (Part D) — It controls the heartbeat, breathing and other involuntary movements.

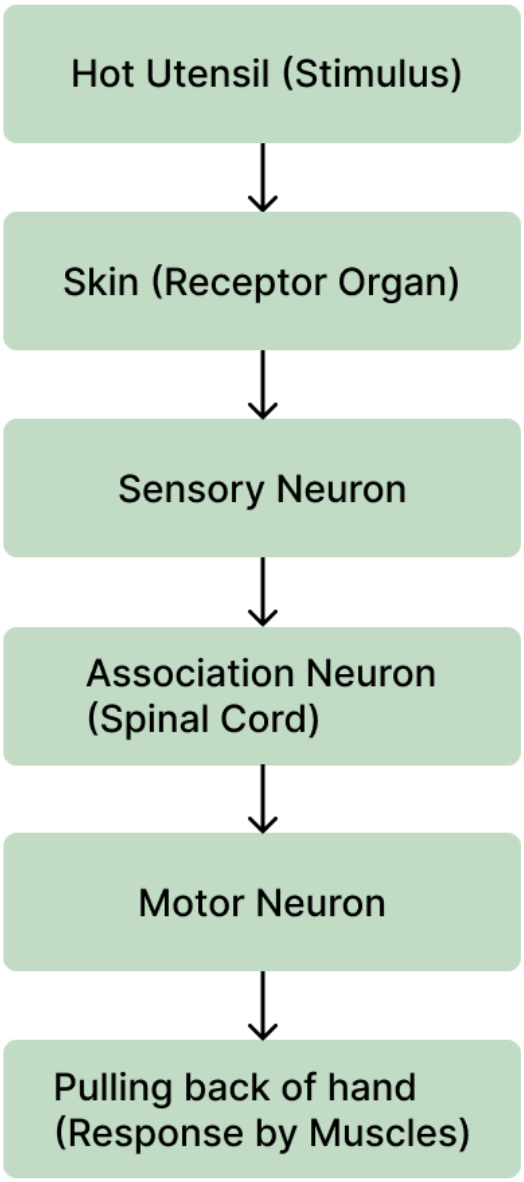
Q2: The diagram shows a reflex arc. Study it and answer the following questions.

1. Name the parts numbered a to d.
2. Using the letters of alphabet shown in the diagram, indicate the direction in which the impulse enters and leaves part c. X to Y or Y to X?
3. What is reflex action?
4. With the help of a flow chart, show a simple reflex action.



Answer

1. The parts numbered a to d are:
   a → sensory neurons
   b → motor neurons
   c → association neurons
   d → cell body of motor neurons
2. The impulse enters through X and leaves through Y.
3. An automatic, spontaneous and mechanical response to a stimulus; controlled by the spinal cord without the involvement of the brain is called a reflex action.
4. Below flow chart shows a simple reflex action of immediate withdrawal of hand on touching a hot object:


Hot Utensil (Stimulus)
Skin (Receptor Organ)
Sensory Neuron
Association Neuron
(Spinal Cord)
Motor Neuron
Pulling back of hand
(Response by Muscles)