Section A

I. Multiple-Choice Questions

Q1. Medulla oblongata controls

A. Smelling

B. Beating of heart and respiratory movement

C. Intelligence and willpower

D. Balancing of 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.

Q2. The balance of the body is controlled by

A. Spinal cord Cerebellum C. Cerebrum D. Medulla

Answer: Cerebellum

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

Q3. The message that travels along a nerve in the form of a wave of chemical disturbance is called

A. Stimulus B. response C. sensation D. 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.

Q4. 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.

Q5. Reflex actions are the actions controlled by

A. brain B. spinal cord

B. both brain and spinal cord D. neither brain nor spinal cord

Answer: spinal cord

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

Q6. 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 — The peripheral nervous system is responsible for voluntary actions such as cycling, swimming, etc.

Q7. Which part of the nervous system controls involuntary actions such as breathing and heartbeat?

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

Answer: c) Medulla oblongata

Explanation: The medulla oblongata, located in the brainstem, controls involuntary actions like breathing, heartbeat, and digestion.

Q8. The part of the nervous system that connects the brain and spinal cord is:

A. Sensory neurons B. Motor neurons C. Interneurons D. Spinal nerves

Answer: d) Spinal nerves

Explanation: The spinal nerves connect the brain and spinal cord, facilitating communication between them.

Q9. Which of the following neurons carry impulses from the body parts to the brain?

A. Motor neurons B. Sensory neurons C. Interneurons D. Reflex neurons

Answer: b) Sensory neurons

Explanation: Sensory neurons carry impulses from sensory receptors in the body (like skin, eyes, etc.) to the brain for processing.

Q10. Which of the following is the largest part of the human brain?

A. Cerebrum B. Cerebellum

C. Medulla oblongata D. Hypothalamus

Answer: a) Cerebrum

Explanation: The cerebrum is the largest part of the brain and is involved in higher functions like thinking, memory, and voluntary movement.

Q11. The spinal cord is located in which part of the body?

A. Brain B. Vertebral column C. Abdomen D. Skull

Answer: b) Vertebral column

Explanation: The spinal cord runs through the vertebral column (backbone) and serves as the main pathway for communication between the brain and the rest of the body.

Q12.Which of the following is NOT a part of the central nervous system (CNS)?

A. Brain B. Spinal cord C. Nerves D. Cerebellum

Answer: c) Nerves

Explanation: The central nervous system (CNS) consists of the brain and spinal cord. Nerves are part of the peripheral nervous system (PNS).

Q13. Which of the following is NOT a part of the peripheral nervous system (PNS)?

A. Cranial nerves B. Spinal nerves

B. Brain D. Sensory receptors

Answer: c) Brain

Explanation: The brain is part of the central nervous system (CNS), not the peripheral nervous system (PNS). The PNS consists of nerves that extend from the brain and spinal cord to other parts of the body.

Q14. Which of the following is the main function of the cerebellum?

A. Thinking and memory B. Voluntary movement control

C. Balance and coordination D. Regulation of body temperature

Answer: c) Balance and coordination

Explanation: The cerebellum is responsible for maintaining balance and coordinating voluntary muscle movements, ensuring smooth and precise actions.

Q15.What is a reflex arc?

A. A path through which a stimulus is sent to the brain
B. A pathway involved in voluntary actions
C. A pathway that involves the brain, spinal cord, and muscles for involuntary responses
D. A part of the spinal cord responsible for movement

Answer: c) A pathway that involves the brain, spinal cord, and muscles for involuntary responses
Explanation: A reflex arc is a neural pathway that controls reflex actions. It involves sensory neurons, interneurons in the spinal cord, and motor neurons, typically bypassing the brain for a quicker response.

Q16. Which of the following types of neurons are involved in carrying impulses from sensory receptors to the central nervous system (CNS)?

A. Motor neurons
B. Sensory neurons
C. Interneurons
D. Reflex neurons

Answer: b) Sensory neurons

Explanation: Sensory neurons carry impulses from sensory receptors in the body to the central nervous system (CNS) for processing.

Q17. Which of the following is a characteristic of a reflex action?

A. It involves the brain for processing
B. It is a voluntary response
C. It is an automatic and rapid response to a stimulus
D. It requires complex thinking

Answer: c) It is an automatic and rapid response to a stimulus
Explanation: Reflex actions are automatic and involuntary responses to stimuli, which occur without conscious thought.

Q18. Which of the following is the correct sequence of components involved in a reflex action?

A. Sensory neuron → Brain → Motor neuron
B. Sensory neuron → Spinal cord → Motor neuron
C. Motor neuron → Sensory neuron → Brain

D. Spinal cord → Motor neuron → Brain

Answer: b) Sensory neuron → Spinal cord → Motor neuron

Explanation: In a reflex action, the sensory neuron detects a stimulus and sends the impulse to the spinal cord, which then passes the impulse to the motor neuron, resulting in a rapid response (like pulling your hand away from a hot object). The brain is not directly involved in reflex actions

Q19.What is the role of the cerebrum in the brain?

A. Coordinating voluntary movements
B. Maintaining balance
C. Thinking, learning, and controlling emotions
D. Regulating heartbeat

Answer: c) Thinking, learning, and controlling emotions

Explanation: The cerebrum is the largest part of the brain and is responsible for higher functions such as thinking, learning, memory, and emotional control

Q20. Which of the following statements about the medulla oblongata is correct?

A. It controls voluntary muscle movement
B. It regulates heart rate and respiration
C. It is involved in thinking and reasoning
D. It helps in balancing the body

Answer: b) It regulates heart rate and respiration

Explanation: The medulla oblongata controls vital functions such as heartbeat, breathing, and blood pressure, and is located at the base of the brainstem.

Q21. What is the main function of sensory neurons?

A. To carry impulses from the brain to muscles
B. To transmit electrical impulses to the spinal cord
C. To carry impulses from the sensory organs to the brain
D. To control reflex actions

Answer: c) To carry impulses from the sensory organs to the brain

Explanation: Sensory neurons transmit sensory information from sensory organs (such as the skin, eyes, or ears) to the central nervous system (brain and spinal cord) for processing.

Q22.Which part of the brain is responsible for emotions, memory, and learning?

A. Medulla oblongata
B. Cerebellum
C. Cerebrum
D. Hypothalamus

Answer: c) Cerebrum

Explanation: The cerebrum is involved in higher cognitive functions such as thinking, memory, learning, and emotional responses.

Q23. What is the primary role of the spinal cord in the nervous system?

A. To process emotions
B. To connect the brain to the body
C. To regulate involuntary functions
D. To control conscious thought

Answer: b) To connect the brain to the body

Explanation: The spinal cord is the main communication pathway between the brain and the rest of the body. It transmits signals to and from the brain, controlling both voluntary and involuntary actions

Q24. What is the primary function of the motor neurons?

A. To carry impulses to the spinal cord
B. To carry impulses from the brain to the muscles and glands
C. To process information from sensory receptors
D. To control reflex actions

Answer: b) To carry impulses from the brain to the muscles and glands

Explanation: Motor neurons carry nerve impulses from the brain and spinal cord to muscles and glands, prompting actions like movement or secretion.

Q25. What does the term "synapse" refer to?

A. The junction where two neurons meet and communicate
B. The protective layer around the axon
C. The part of the neuron that carries impulses to the body
D. The cell body of a neuron

Answer: a) The junction where two neurons meet and communicate

Explanation: The synapse is the small gap between two neurons where neurotransmitters are released, allowing for communication between neurons.

Q26. Which of the following best describes the function of the central nervous system?

A. It controls voluntary movements.
B. It connects the body to the brain.
C. It processes sensory input and controls reflexes.
D. It coordinates the immune system response.

Answer: c) It processes sensory input and controls reflexes.

Explanation: The central nervous system (CNS) consists of the brain and spinal cord and is responsible for processing sensory information and controlling reflex actions and voluntary activities.

Q27. Which of the following is the odd one out?

A. Reflex arc B. Synapse C. Impulse Nerve

Answer: b) Synapse

Explanation: A reflex arc, impulse, and nerve are all involved in the transmission of signals in the nervous system, whereas a synapse is the gap between two neurons where communication takes place. Therefore, the synapse is the odd one out.

Q28. The message that travels along a nerve in the form of a wave of chemical disturbance is called

A. Stimulus B. response C. sensation D. 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.

Q29. What is the role of the myelin sheath in a neuron?

A. To transmit electrical impulses
B. To protect the neuron
C. To increase the speed of nerve impulses
D. To store nutrients

Answer: c) To increase the speed of nerve impulses
Explanation: The myelin sheath is a fatty layer that covers the axon of some neurons. It helps speed up the transmission of electrical impulses by insulating the axon.

II. Fill in the blanks:

1. The _____ is the control center of the nervous system.

Answer: Brain
Explanation: The brain is the central organ of the nervous system responsible for controlling various functions such as thinking, memory, and body movements.

2. The functional unit of the nervous system is called a _____.

Answer: Neuron
Explanation: A neuron is the basic functional and structural unit of the nervous system that transmits electrical impulses.

3._____ neurons transmit electrical impulses from the spinal cord to muscles and glands.

Answer: Motor neurons

Explanation: Motor neurons carry commands from the central nervous system to muscles and glands, enabling movement and other functions.

4. The _____ is the part of the brain that controls autonomic functions like heart rate, respiration, and blood pressure.

Answer: Medulla oblongata

Explanation: The medulla oblongata controls essential life functions such as breathing, heart rate, and digestion without conscious effort.

5. The _____ is the central part of the nervous system, consisting of the brain and spinal cord.

Answer: Central nervous system

Explanation: The central nervous system (CNS) consists of the brain and spinal cord and is responsible for processing and integrating information.

6. **The _____ is the protective covering that surrounds and insulates the axon of a neuron.**

Answer: Myelin sheath

Explanation: The myelin sheath is a fatty layer that insulates the axon and speeds up the transmission of electrical impulses along the neuron.

7. _____ carries both sensory and motor fibers.

Answer: Mixed nerves.

Explanation: A mixed nerve is any nerve that contains both sensory (afferent) and motor (efferent) nerve fibers. Spinal nerves are nerves that originate from the spinal cord. They consist of 31 pairs. They perform both sensory and motor functions which is why they are known to be mixed nerves.

8. There are _____ pairs of cranial nerves.

Answer: 12

Explanation: There are 12 of them, each named for its function or structure. Their functions are usually categorized as being either sensory or motor.

9. There are _____ pair of spinal nerves in humans.

Answer: 31

Explanation: Spinal nerves are the major nerves of the body. **There are a total of 31 symmetrical pairs of spinal nerves** that emerge from different segments of the spine.

10. Brain is enclosed in _____.

Answer: Cranium

11. _____ matter is made up of cell bodies of neurons. _____ matter is made up of nerve fibers.

Answer: Grey, White

12. Change in the environment that leads to change in the activity of the body is called _____.

Answer: Stimulus.

13. A motor neuron is _____.

Answer: Multipolar.

Explanation: Multipolar neurons are typically characterized by a single axon and two or more dendrites arising from the cell body.

14. The actions which are under the control of the spinal cord are called _____.

Answer: Reflex actions.

15. The path of impulse in a reflex reaction is called _____.

Answer: Reflex arc.

16. The sense organs have special cells called _____.

Answer: Receptors.

17. The speed of the response in voluntary action is _____ while in reflex action it is _____.

Answer: slow, fast.

III. Match the following:

	Colum A		Colum B
a	Nerves arise from the spinal cord	1	Cerebrum
b	Cranial and spinal nerves	2	Cerebellum
c	Nerves arise from the brain and reach the organs in the head region.	3	Myelin sheath
d	Perceive pain, sound, touch, taste and smell	4	Spinal cord
e	It has many furrows but lacks convolutions	5	Spinal nerves
f	Protected by vertebral column	6	Effector
g	Responds to stimuli after receiving impulse	7	Cranial nerves
h	Prevent the mixing of impulses in the adjacent nerve fibers	8	Peripheral Nervous system

Answer:

Nerves arise from the spinal cord	Spinal nerves
Cranial and spinal nerves	Peripheral Nervous system
Nerves arise from the brain and reach the organs in the head region.	Cranial nerves
Perceive pain, sound, touch, taste and smell	Cerebrum
It has many furrows but lacks convolutions	Cerebellum
Protected by vertebral column	Spinal cord
Responds to stimuli after receiving impulse	Effector
Prevent the mixing of impulses in the adjacent nerve fibers	Myelin sheath

Section B

Short Answer Question:

Q1. Name the two types of effectors

Answer: Two types of effectors:

1. Muscle

2. Gland

Q2. Define Synapse.

Answer: A synapse is a small junction used for communication between two neurons.

Q3. Write one important role of Receptors.

Answer: Receive the stimulus.

Q4. Differentiate between the following pairs of terms based on what is indicated within the brackets :

(a) Stimulus and response (definition)

(b) Motor nerve and sensory nerve (function)

(c) Cerebrum and medulla oblongata (function)

(d) 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 usually results in a change in the activity of the body.	The activity of the body due to the stimulus.

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

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

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

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

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

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

Q5. People who have had too much alcoholic drinks have problems walking straight and driving. Which part of their brain has been affected?

Answer: Cerebellum is the part of the brain that is affected by alcohol as it is the part that maintains the balance of the body and controls the coordination of voluntary muscles.

Q6. 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.

Q7. 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.

Section C

Long Answer Questions:((Reasoning)

Q8. The brain is the control center of the body, but why do you think reflex actions happen even before the brain is involved?

Answer: Reflex actions, such as pulling your hand away from a hot surface, happen very quickly. The spinal cord processes this type of action before the brain even has time to interpret it. This happens

because the reflex arc involves only the sensory neuron, interneuron, and motor neuron, bypassing the brain for a faster response.

Q9. If the myelin sheath around the axon of a neuron gets damaged, what effect might this have on the transmission of nerve signals?

Answer: The myelin sheath acts as an insulating layer that helps speed up the transmission of nerve signals. If the myelin sheath is damaged, the nerve impulses may slow down or even fail to reach their destination. This can lead to conditions like multiple sclerosis, where the nervous system's ability to transmit signals is impaired.

Q10. Why does the body react differently to touching a hot surface compared to stepping on a sharp object, even though both actions involve pain?

Answer: The body reacts differently due to the pathways involved in the reflex arc. When touching a hot surface, the sensory receptors send a signal to the spinal cord, which immediately triggers a motor response to pull the hand away. In contrast, stepping on a sharp object may involve additional processing in the brain for a more coordinated response, even though it also involves reflex actions.

Q11. If the spinal cord is injured, why does a person lose the ability to move parts of their body below the injury site?

Answer: The spinal cord acts as the main pathway for signals between the brain and the rest of the body. If the spinal cord is damaged, the communication between the brain and muscles below the injury site is disrupted. This leads to loss of movement or sensation, as the brain can no longer send motor signals, or receive sensory input, from these areas.

Q12. Why is it important for the nervous system to have both sensory and motor neurons, and how do they work together?

Answer: Sensory neurons carry information from sensory receptors (like the skin, eyes, and ears) to the brain, allowing the body to perceive the environment. Motor neurons carry signals from the brain to muscles, enabling movement. These two types of neurons work together by allowing the body to perceive and respond to its surroundings. For example, when you touch something hot, sensory neurons send a pain signal to the brain, and motor neurons trigger a quick response, like pulling your hand away.

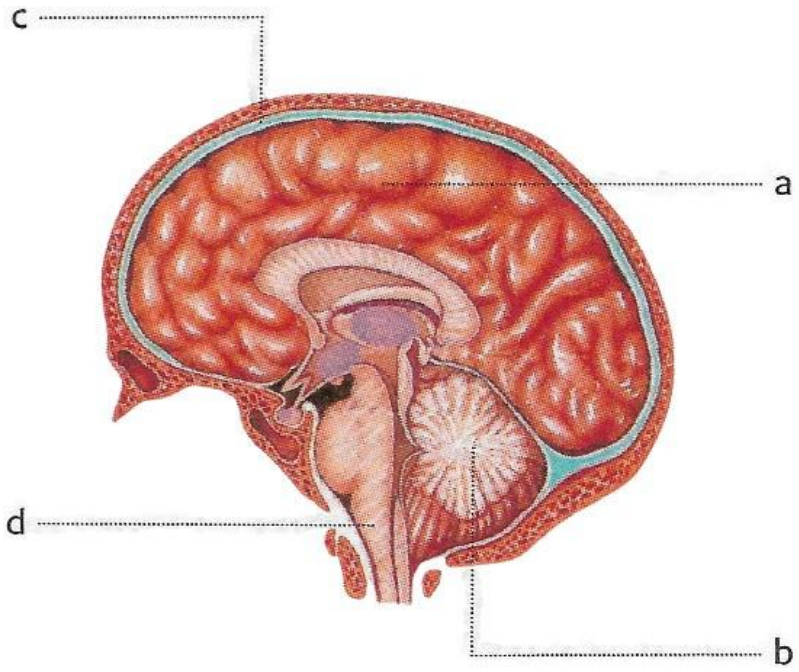
Q13. How does the nervous system help us react to a sudden danger, like stepping into traffic?

Answer: When you suddenly step into traffic, sensory neurons send a signal to the brain about the dangerous situation. The brain processes the information and quickly sends signals through the motor neurons to your muscles, helping you move out of the way fast. This rapid communication between the brain and body helps prevent harm in dangerous situations.

Section D (Picture Study)

Q14. 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

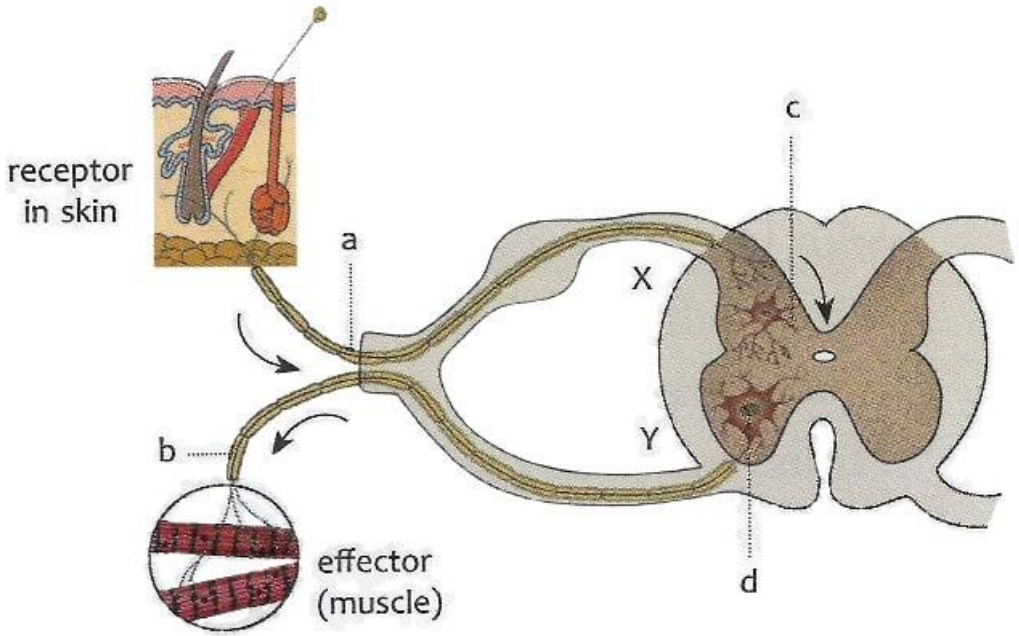
2. The main function of the parts numbered c and d are:

   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.

Q15. 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 the 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: