1 SENSATIONS & RESPONSES

IMPORTANT POINTS

1. **Stimulus :** The senses that evoke responses in organisms are called stimuli. These are of two types - external and internal stimuli.

   External stimuli: Sound, touch, heat, chemicals, pressure, cold, radiations.

   Internal stimuli: Hunger, touch, infection, pressure variation, thirst, exhaust.

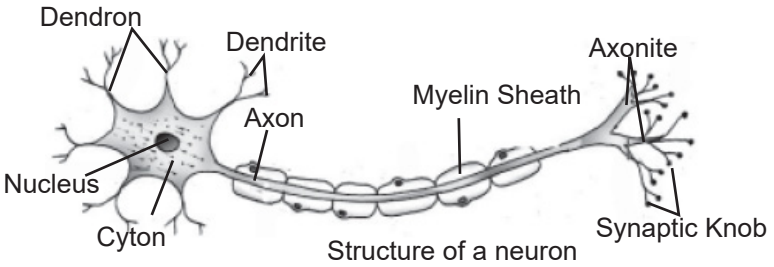
   • Nerve cells or receptors that are capable of receiving stimuli from within the body and external environment are located in sense organs and other parts of the body.

   • Nerve cells are capable of receiving stimuli from within the body and external environment. They also transmit messages to and from central nervous system and organs.

   • The function of the nervous system is to generate and coordinate responses according to internal and external changes.

   • The nervous system includes the brain, spinal cord, nerves, and receptors.

2. **Neuron :** A neuron has mainly the following parts : a cyton (cell body), impulse receiving dendrons and branches of dendrons is dendrites, impulse transmitting axon and branches of axon is axonites, synaptic knobs for secreting neurotransmitter. In certain neurons, the nerve fibers are covered by myelin sheath, made up of white Schwann cells.



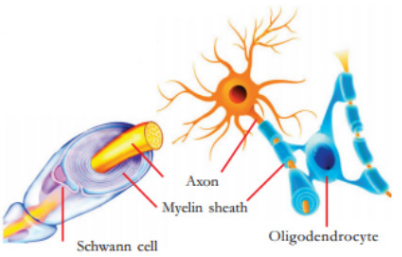
Structure of a neuron

3. Make a table which shows the function and peculiarities of different parts of nerve cell.

Parts of nerve cell	Peculiarities	Function
Dendrite	Branches of dendron	Receives impulses
Dendron	Part projecting out from the cyton	Carries impulses from dendrite to the cell body
Cyton/Cell body	It contains nucleus	Passes impulses to the axon
Axon	Longest filament from the cell body	Carries impulses from the cell body to outside
Schwann cells	Encircle the axon	Protects the axon and increases the speed of impulse

Axonite	Terminal branch of axon	Carries impulses to the synaptic knob
Synaptic knob	Tip of axonite	Secretes neurotransmitter

4. Analyse figure given below and write inferences on myelin sheath.



Formation of myelin sheath:

Schwann cells, a part of nervous tissues repeatedly encircle the axon to form the myelin sheath. Myelin sheath in the brain and spinal cord is formed of specialized cells called Oligodendrocytes. The myelin sheath has a shiny white colour.

Functions of myelin sheath:

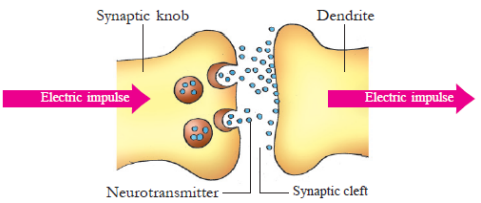
- Provide nutrients and oxygen to the axon.
- Accelerate impulses.
- Act as an electric insulator.
- Protects the axon from external shocks.
- Gives white appearance (white matter) to the neural parts.

5. Differentiate between white matter and grey matter.

Ans. The part of nerve, where myelinated neurons are present in abundance, is called as the white matter. The part of nerve where the cell bodies and nonmyelinated neurons are present is called as the grey matter.

6. How is the impulses transmit through the neurons?

Ans. When impulses reach at the synaptic knobs, a chemical substance, known as neurotransmitter, is released in the synaptic cleft. This neurotransmitter stimulates the adjacent dendrites to form new electric impulses.



Synapse:

The junction between neurons or between neurons and muscles or glands is known as the synapse. It helps to regulate the speed and direction of impulses. The impulses are transmitted across the synaptic cleft only through a chemical (neurotransmitter), secreted from the synaptic knobs.

This neurotransmitter stimulates the adjacent dendrites to form new electric impulses. Acetylcholine and dopamine are examples of neurotransmitters. Synapse helps to regulate the speed and direction of impulses.

7. Complete the flow chart that shows the transmission of impulses through a neuron to other neuron.

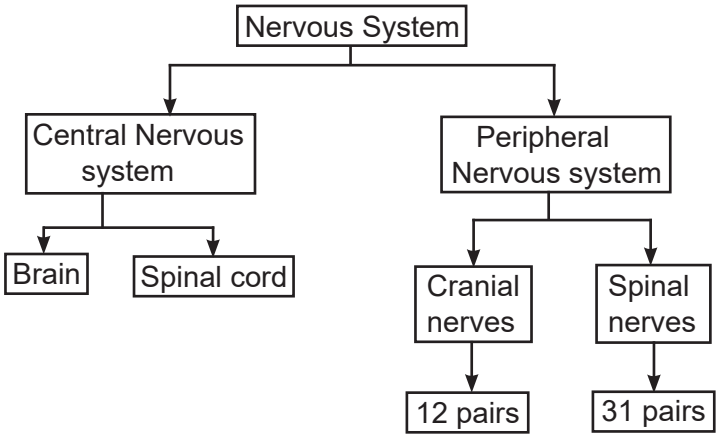
Ans. Impulse due to stimulus → dendrites → dendrons → cyton → axon → axonites → synaptic knob → secretion of neurotransmitter to the synaptic cleft → Stimulation in the adjacent dendrites → Impulse forms.

8. Analyse table 1.1 and prepare notes in your science diary.

Nerves and their peculiarities	Functions
Sensory nerve (formed of sensory nerve fibres)	carries impulses from various parts of the body to the brain and the spinal cord.
Motor nerve (formed of motor nerve fibres)	carries impulses from brain and spinal cord to various parts of the body.
Mixed nerve (formed of sensory nerve fibres and motor nerve fibres)	carries impulses to and from the brain and spinal cord

9. Complete the Worksheet.

Ans.



10. How does the dorsal root differ from ventral root?

Ans Sensory impulses reach the spinal cord through the dorsal root. Motor impulses go out of the spinal cord through the ventral root.

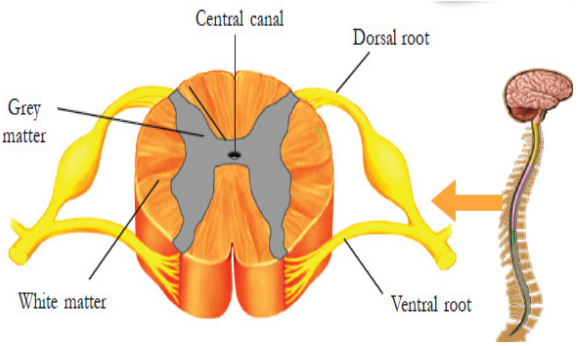
11. Prepare a table showing different parts of brain, peculiarity and functions of each.

Ans.

Part of the brain	Peculiarity	Function
Cerebrum	The largest part of the brain with many fissures and folds in its cotex.Cerebral cortex is seen as grey matter and inner medulla as white matter.	Centre of feeling senses and also the centre of qualities like thought, imagination, intelligence and memory.
Cerebellum	The second largest part, seen as two flaps.	Coordinates muscular activities and maintains equilibrium of the body.
Medulla oblongata	The rod shaped lower part	Controls involuntary actions like heart beat and breathing.
Thalamus	The seat of cerebrum	Acts as relay station of impulses to and fro the cerebrum and also analyses the impulses.
Hypo thalamus	Seen just below the thalamus	Plays a major role in the maintenance of homeostasis.

Spinal Cord - Structure

Spinal cord, which is the continuation of medulla oblongata, is situated within the vertebral column and is covered by a three-layered membrane, called meninges. The outer part of spinal cord is white matter and inner is grey matter. The central canal at its center is filled with CSF. There are 31 pairs of spinal nerves arising from the spinal cord. A dorsal root and a ventral root join to form a spinal nerve.



12. Complete the flowchart of the pathway of impulse during a reflex action.

Stimulus → **Receptor** Generate impulse → **Sensory neuron** carries impulses to the spinal cord → **Interneuron** The neuron that connects the sensory neuron and Motor neuron Generates quick resonses related muscles according to the sensory impulses → **Motor neuron** Carries the information from spinal cord to related musceles → **Related muscle** withdraws the hand by the action of the muscles

13. Mention the functions of spinal cord.

Ans. • Transmitting impulses from different parts of our body to and fro the brain.

• Coordinates the rapid and repeated movements during walking, running, etc.

• Effects certain reflex actions.

Reflex Actions: Reflex actions are the accidental and involuntary responses of the body in response to a stimuli. There are cerebral and spinal reflexes.

Reflex Arc: Reflex arc is the pathway of impulses in the reflex action.

14. What are the parts that involve in a reflex arc?

Ans. A reflex arc involves.

• stimulus receiving receptor. • sensory neuron. • inter neuron.

• motor neuron. • effecting muscles.

15. What you mean by Cerebral reflex?

Ans. A reflex under the control of the cerebrum is called cerebral reflex Eg. We blink our eyes when light suddenly falls on our eyes.

16. There may be instances in your life when you felt sudden fear or sadness. Write down some of those experiences.

Ans. • Suddenly seeing a snake while walking.

• On touching hot objects, the hand is withdrawn.

• Withdrawal of the leg when a spine pierce into the feet.

• When a housefly flies towards the eye, the eye blink.

17. Analyze illustration **(page No. 18)** to understand the actions of sympathetic and parasympathetic systems during emergency situations and complete table.

Ans.

Organ	Sympathetic system	Para sympathetic system
Eye	the pupil dilates	pupil constricts
Salivary gland	production of saliva decreases	production of saliva increases
Lung	trachea dilates	trachea constricts
Heart	heart beat increases	heart beat becomes normal
Stomach	gastric activities slow down	gastric activities become normal
Liver	glycogen is converted to glucose	Glucose is converted to glycogen
Intestine	peristalsis slows down	peristalsis becomes normal
Urinary bladder	urinarry bladder retains to normal state	urinary bladder contracts

18. The diseases affecting the nervous system

Disease	Causes	Symptoms
Alzheimer's	Accumulation of an insoluble protein in the neural tissues of the brain. Neurons get destroyed.	Loss of memory, inability to recognize friends and relatives, inability to do routine works.
Parkinsons	Destruction of specialised ganglions in the brain. Production of dopamine, a neurotransmitter reduces.	Loss of body balance, irregular movement of muscles, shivering of the body, profuse salivation
Epilepsy	Continuous and irregular flow of electric charges in the brain.	Epilepsy due to continuous muscular contraction, frothy discharge from the mouth, clenching of the teeth following which the patients falls unconscious.
Autism	neuro developmental disorder	impaired social interaction, verbal and non-verbal communication, restricted and repetitive behaviour.

19. What are the changes that take place in the body during emergency situations?

Ans. During an emergency situation:

- Heart beat increases.
- Breathing rate increase decreases.
- Dilates eye pupil.
- Salivary secretion decreases.

Autonomous nervous system:

The autonomous nervous system is composed of the sympathetic system and the parasympathetic system.

There are many activities which occur beyond our conscious area. Such activities are controlled by the autonomous nervous system. The endocrine system is also associated with the nervous system for performing this function.

LET US ASSESS

1. The part of the brain which helps to maintain body balance,

(a) Cerebrum. (b) Cerebellum. (c) Medulla oblongata. (d) Thalamus.

Ans. (b) Cerebellum

2. Identify the relationship and fill in the blanks.

Irregular flow of charge in the brain : Epilepsy.

Decreased production of dopamine :….?

Ans. Parkinsons.

3. Analyse the following instances and answer the questions.

- a thorn accidentally pierce the foot.
- the leg is withdrawn.
- the thorn is taken out slowly.

(a) Write the stimuli and response.

(b) Which is the conscious response?

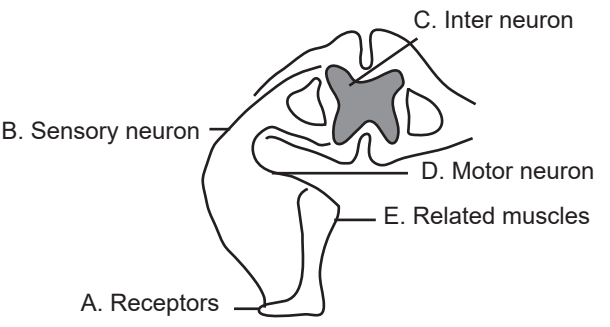
(c) Was the leg withdrawn after sensing the pain? Which action took place there? Prepare an illustration showing the parts through which the impulses transmitted.

Ans. (a) A thorn accidentally pierce the foot (stimulus) and the leg is withdrawn (response).

(b) The thorn is taken out slowly.

(c) No, reflex action.

Stimulus → Receptor → Sensory nerve → Interneuron → motor nerve → related muscle → Withdrawl of leg



ADDITIONAL QUESTIONS AND ANSWERS

1. Name the parts of our nervous system.

Ans. Brain, spinal cord, nerves and receptors.

2. The structural and functional units of the nervous system ?

Ans. Neurons (nerve cells).

A neuron has mainly the following parts; a cyton (cell body), impulse receiving dendrons (branches are known as dendrites), impulse transmitting axon (branches are axonites) and synaptic knobs for secreting neurotransmitter. In certain neurons, the nerve fibres are covered by myelin sheath, made up of white shining Schwann cells.

3. Name the protective covering of nerve fibres (axons) ? Mention its function.

Ans. Myelin sheath.

Functions : * Provide nutrients and oxygen to the axon.

* Accelerate impulses. * Act as an electric insulator.

* Protects the axon from external shocks.

* Gives white appearance (‘white matter’) to the neural parts.

4. Explain the function of different parts of nerve cell.

Ans.

Dendrite	Receives impulses
Dendron	Carries impulses from dendrite to the cell body
Cyton / Cellbody	Passes impulses to the axon.
Axon	Carries impulses from the cell body to outside.
Axonite	Carries impulses to the synaptic knob
Synaptic knob	Secretes neurotransmitter

5. Name the swollen ends of axon. How is it important in the transmission of impulse ?

Ans. Synaptic knobs, from which neurotransmitter secretes.

When impulses reach at the synaptic knobs, a chemical substance, known as neurotransmitter, released in the synaptic cleft. This chemical stimulates the adjacent dendrites to form new electric impulses.

6. Give an example for neurotransmitter.

Ans. Acetyl choline, Dopamine.

7. Name the two types of neurons ?

Ans. **Sensory neurons** – carry impulses from different body parts to the brain and spinal cord

Motor neurons - carry impulses from the brain and spinal cord to various parts of body.

8. A person could not walk easily after drinking alcoholic beverages. Can you say why?

Ans Alcohol affects the normal functioning of his cerebellum, which maintains equilibrium of the body through muscular coordination. So he could not walk easily.

9. The outer covering of brain and spinal cord ?

Ans. Meninges.

10. Name the fluid which provides nutrients and oxygen to brain tissues ? Give its function ?

Ans. Cerebrospinal fluid (CSF).

- CSF provides nutrients and oxygen to brain tissues.
- Regulates the pressure inside the brain.
- Protects brain from injuries.

11. Name different parts of brain. Explain its feature and functions of each aprt.

Ans.

Part of brain	Features	Function
Cerebrum	The largest part of the brain with many fissures and folds in its cortex. Cerebral cortex is seen as grey matter and inner medulla as white matter.	-Centre of thought, imagination, intelligence and memory. -Centre of feeling senses. -Controls voluntary movements.
Cerebellum	The second largest part, seen as two flaps.	Coordinates muscular activities and maintains equilibrium of the body.
Medulla oblongata	The rod shaped lower part	Controls involuntary actions like heart beat and breathing.
Thalamus	The seat of cerebrum	Acts as relay station of impulses to and fro the cerebrum and also analyses the impulses.
Hypothalamus	Seen just below the thalamus	Plays a major role in the maintenance of homeostasis.

12. There are many fissures and folds in the cerebral cortex (the peripheral part of brain). What is the advantage of this ?

Ans. This is an adaptation to include more number of neurons and thereby increase the efficiency of cerebrum.

13. Any mild injury to the medulla oblongata may lead to sudden death. Why ?

Ans. Medulla oblongata controls involuntary actions like heart beat and breathing. Any mild injury to medulla oblongata results malfunctioning of breathing and heartbeat and this

may lead to death.

14. Define Reflex arc.

Ans. Reflex arc is the pathway of impulses in a reflex action.

This includes : a. stimulus receiving receptor b. sensory neuron c. interneuron

d. motor neuron e. effecting muscles.

15. Explain different neural disorders, their reason and symptoms.

Ans.

Disorder	Cause	Symptom
Alzheimer's	Continuous degeneration of neurons due to the accumulation of an insoluble protein.	Complete loss of memory.
Parkinsons	Degeneration of specific ganglia in the brain due to the deficiency of dopamine	Loss of body balance. Tremor in muscles, flow of saliva
Epilepsy	Discharge of irregular electrical impulses from brain.	Fits, frothy discharge from mouth, clenching of teeth, unconsciousness

16. Name a neurotransmitter, which is secreted in the brain. What will happen when the production of this hormone cease in a person ?

Ans. Dopamine. The deficiency of dopamine may result a disease called Parkinsons.

17. Select the suitable code from the indicators and write them on the basis of correct features in the given boxes.

Cerebrum – CRB Cerebellum – CRL

Medulla oblongatas – MOG Hypothalamus. – HYP Thalamus – THL

Ans. (1) The part that provide awareness of vision, hearing, smell, tastes, touch, heat. (CRB)

(2) Co-ordinates muscular activities and maintains equilibrium of the body. (CRL)

(3) Plays a major role in the maintenance of homeostasis. (HYP)

(4) Controls involuntary actions like heartbeat, breathing, etc. (MOG)

(5) Relay station of impulses to and fro the cerebrum. (THL)

(6) Centre of thought, intelligence, memory and imagination. (CRB)

(7) The second-largest part of the brain. (CRL)

(8) The rod-shaped medulla oblongata is seen below the cerebrum. (MOG)

(9) Greymatter is seen in the external cortex and white matter is seen in the internal

medulla. (CRB)

(10) Part that controls pituitary gland. (HYP)

18. Classify the following items as external stimulus and internal stimulus.

Sound, hunger, touch, heat, chemicals, pressure, infection, pressure variation, thirst, cold, exhaust, radiations.

Ans. External stimuli : Sound, touch, heat, chemicals, pressure, cold, radiations.

Internal stimuli : Hunger, touch, infection, pressure, variation, thirst, exhaust.

19. Suppose that the formation of CSF ceases in meninges, what would be the aftereffect of this?

Ans When the formation of CSF ceases, it will adversely affect our nervous system. Because, CSF provides nutrients and oxygen to brain tissues, regulates the pressure inside the brain and also protects brain from injuries.

20. Give suitable explanations for each statement given below.

(a) Synapses are of different types. (b) Spinal nerves are mixed nerves.

Ans. a) Synapse is the junction between two neurons or a neuron and a muscle cell or a neuron and a glandular cell

b) Impulses from different parts of the body are transmitted to and from the brain through the spinal cord

21. Given below are the symptoms of a disease. Analyse them and answer the following questions.

- Loss of memory.
- Inability to do routine works.

(a) Identify the disease. (b) Mention the cause of the disease.

Ans. (a) Alzheimer's

(b) Accumulation of an insoluble protein in the neural tissues of the brain. Neurons get destroyed.

22. After a road accident, a person lost his memory for a few days. In which part of his brain got injured?

Ans. Cerebrum.

23. List out the physiological changes that may occur when a boy facing the audience during a competition.

Ans.
- Increases the rate of heartbeat.
- Dilation of trachea / Increases breathing.
- Conversion of glycogen to glucose.
- Secretion of hormones increase.
- Decrease in the secretion of saliva.

24. Rajesh is taking his food watching blood cold scenes of a film on TV. Will this affect his

digestion? Make inferences in connection with his sympathetic and parasympathetic system.

Ans. When excitement occurs, sympathetic nervous system enhances the physiological activities, except activities related to digestion. Since sympathetic system worked in Rajesh, it will affect his digestion and related activities.

25. Find out the odd one. Write down the common feature of others:

Intelligence, Hearing, Breathing, Imagination.

Ans. Breathing. All others are controlled by the cerebrum.

26. Find out the relationship between the pair of words and fill up the blanks.

(a) Relay of impulses : thalamus

…… : hypothalamus

Ans. Homeostasis

27. Find out the odd one and identify the common features of others:

Dendrite, Acetyl Choline, Axon, Synaptic knob.

Ans. Acetyl Choline. Others are parts of neurons.

28. Which is related to Alzheimer's disease from those given below? What is the chief symptom of the disease?

(a) Degeneration of specific ganglion.

(b) Accumulation of an insoluble plaque in nervous tissue.

(c) Irregularity in the electric Impulse in the brain.

Ans. (b) Accumulation of an insoluble protein in nervous tissue.

29. Find out word pair relation and fill in the blanks.

(a) Cerebellum : Equilibrium.

.....…….. : Functions as the relay station of impulses.

Ans. (a) Thalamus.

30. Some indications of a disease are given below.

(1) Loss of complete memory, even the memory regarding the day, date, etc.

(2) The patient becomes unaware of his actions.

(3) It is common among aged people.

(a) Identify the disease. (b) How is it caused?

Ans. (a) Alzheimer's disease.

(b) Continuous degeneration of neurons due to plaque by the accumulation of an

insoluble protein.

31. Find out the relationship between the pair of words and fill up the blanks.

Cranial nerve : Communication from Brain to organ.

……..... : Communication from Spinal cord to organ.

Ans. Spinal Nerve.

32. Find out the odd one and comment on the common feature of others.

(a) Dendron, Axon, Ampulla, Dendrite, Axonite.

(b) Seeing beautiful cinema, Thinking, Hearing melodious song, Sudden withdrawal of legs while stepping on fire accidentally, Sensing the taste of sweets.

Ans. (a) Ampulla, others are parts of neurons.

(b) Sudden withdrawal of legs while stepping on fire accidentally, others are conscious activities.

33. List of various physiological activities in human body which are under the control of 2% autonomous nervous system are given below. Group them into actions of sympathetic system (Group A) and parasympathetic system (Group B).

(a) Pupil dilates. (b) Urinary bladder contracts.

(c) Trachea dilates. (d) Function of the stomach is stimulated.

(e) Secretion of saliva increases. (f) Glycogen is converted into glucose.

(g) Peristalsis slows down. (h) Rate of heartbeat decreases.

Ans. Sympathetic System:

(a) Pupil dilates. (c) Trachea dilates.

(f) Glycogen is converted to glucose. (g) Peristalsis slow down.

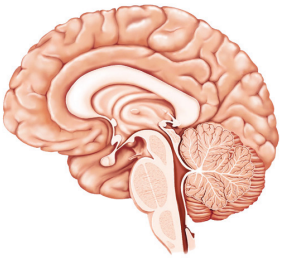
Parasympathetic System:

(b) Urinary bladder contracts. (d) function of stomach is stimulated.

(e) Secretion of saliva increases. (h) Rate of heartbeat decreases.

Ans. (i) Parkinson disease. (ii) Deficiency of a neurotransmitter dopamine.

34. Redraw the picture and answer the following questions.



(a) Identify and label the parts according to the functions given below:

(i) the part which maintains balance and equilibrium of the body?

(ii) the part which controls heartbeat.

(iii) the part which controls voluntary activities.

(b) Write one more function for each of these three identified parts.

Ans. (b) i) Cerebellum-co-ordinating muscular activities.

(ii) Medulla oblongata – Controls breathing.

(iii) Cerebrum – center of intelligence.

35. Symptoms of a disease related to nervous system is given below.

- Tremor due to the irregular involuntary movement of muscles.
- Uncontrolled flow of saliva.
- Loss of balance of the body.

(i) Identify this disease and write down its name.

(ii) What is the cause of this disease?

36. (a) Which is the part of nervous system excited during emergency situation?

(b) How does this system acts on the following internal organs?

Heart, Liver, Urinary bladder and Eye.

Ans. (a) Sympathetic nervous system

(b) Heart – Rate of heartbeat increases, Liver - Glycogen is converted into glucose, Urinary bladder – Regains its original state, Eye – Pupil dilates.

37. Find out the odd one. Justify your answer.

(a) Blinking of eyes in intense light.

(b) Withdrawing hands-on touching hot object.

(c) Withdrawing of legs when contact with thorns.

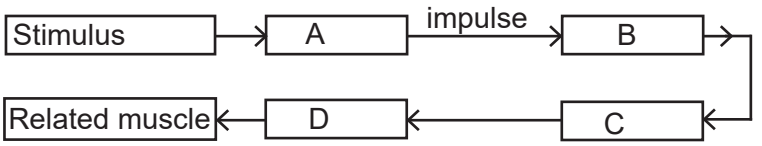
Ans. (a) Blinking of eyes in intense light. This is cerebral reflex. Others are spinal reflexes.

38. Find out 'word pair relation' and fill up.

Cerebrum : Thought Cerebellum : .....

Ans. Equilibrium

39. The parts of a reflex arc are illustrated in the form of a flow chart. Fill in the blank portions and complete the flow chart.



Ans. (A) Receptor. (B) Sensory neuron. (C) Interneuron. (D) Motor neuron.

40. Appu was taken by fear, on seeing a snake on his way to school and ran back.

(i) Which part of the autonomous nervous system controlled the body activities of Appu in the above situation?

(ii) What are the changes that take place in the intestine and eye during the above situation?

Ans. (i) Sympathetic system.

(ii) Peristalsis in the intestine slows down, pupil dilates.

41. Which of the following activities take place under the control of the parasympathetic system?

Urinary bladder contracts, glycogen is converted to glucose,
Gastric activities slow down, production of saliva increases.

Ans. ● Urinary bladder contracts ● Production of saliva increases.

42. The brain contains a fluid which is formed from and reabsorbed into the blood.

(a) Identify the fluid. (b) What are the functions of that fluid?

Ans. (a) Cerebrospinal fluid.

(b) Provides nutrients and oxygen to brain tissues, protects the brain from injuries.

43. Some of the activities of the autonomous nervous system are given below. Analyze the activities and tabulate them under appropriate headings.

(a) Pupil dilates. (b) Production of hormones decreases.

(c) Converts glucose to glycogen. (d) Peristalsis slows down.

Ans.

Sympathetic system	Parasympathetic system
(a) Pupil dilates	(c) Converts glucose to glycogen
(d) Peristalsis slows down	(d) Production of hormone decreases

44. Write down the action of the parasympathetic and the sympathetic system in the following organs.

Organ	Parasympathetic	Sympathetic
Eye	(a)	(b) .....
Heart	(c)	(d) .....

Ans. (a) Pupil constricts. (b) Pupil dilates.

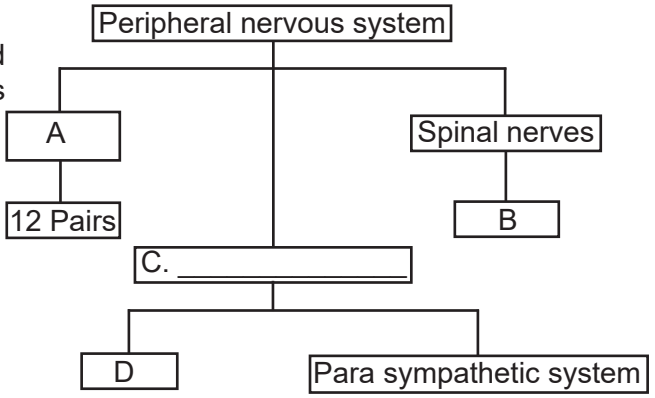
(c) Heartbeat becomes normal. (d) Heartbeat increases.

45. The dorsal root and the ventral root play a significant role in the transmission of impulses between spinal cord and different parts of the body. Do you agree with this statement? Justify.

Ans. • Yes. Sensory impulses reach the spinal cord through the dorsal root.

• Motor impulses go out of the spinal cord to different parts of the body through ventral root.

46. One of the components of the nervous system is illustrated below. Fill in the blanks appropriately.



Ans. (A) Cranial nerves. (B) 31 pairs.

(C) Autonomous nervous system. (D) Sympathetic system.

47. All reflex actions take place under the control of the spinal cord. Evaluate the statement and justify with suitable examples.

Ans. • All reflex actions are not under the control of the spinal cord.

• Cerebral reflex / some reflex actions are under the control of the cerebrum.

Eg. We blink our eyes when light suddenly falls on eyes/any cerebral reflex.

48.

Accumulation of an insoluble protein in the neural tissues of the brain	Destruction of specialised ganglions in the brain
X	Y

The causes of diseases related to the nervous system in two individuals X and Y are given above.

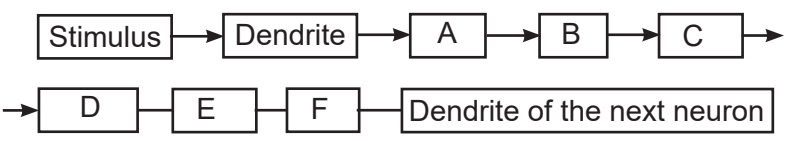
(i) Identify the diseases?

(ii) The deficiency of which neurotransmitter causes disease in Y?

Ans. (i) X - Alzheimer's. (ii) Dopamine.

49. The flow chart given below indicates the transmission of impulse from one neuron to another. Complete the flow chart using the data given in the box.

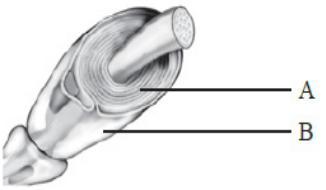
Cell body, neurotransmitter, axon, synaptic nobe, axonite, dendron



Ans (A) Dendron. (B) Cell body. (C) Axon.

(D) Axonite. (E) Synaptic knob. (F) Neurotransmitter.

50. Examine the picture given below.



(a) Identify A and B.

(b) What is the role of A in the transmission of electric impulses?

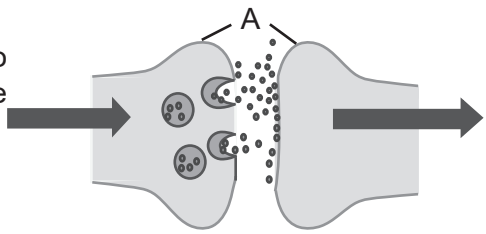
Ans. (a) A – Myelin sheath. B – Schwann cell.

(b) 1. accelerates impulses.

2. act as an electric insulator.

3. provides nutrients and oxygen to axon.

51. The illustration given below indicates the transmission of impulses from one neuron to another. Observe the illustration and answer the following question.

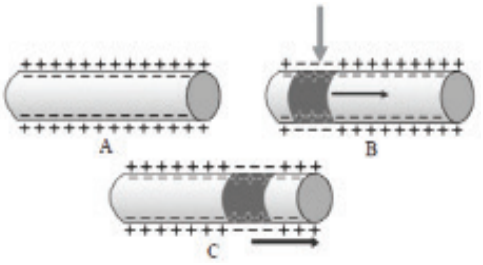


(a) Identify the part in the illustration.

(b) Identify the chemical substance which is secreted from A. Give one example for this chemical substance.

Ans. (a) Synapse. (b) Neurotransmitters. Eg : Acetylcholine / Dopamine.

52. Analyze the illustration of impulse transmission through axon and answer the following questions.



(a) What are the changes that take place in illustration B when compared to A? Give reason for this change.

(b) Explain how this change brings about the transmission of impulses through axon.

Ans. (a) When stimulated, ionic equilibrium in the particular part changes and the outer surface of the plasma membrane of axon becomes negatively charged while the inner surface becomes positively charged.

(b) 1. These changes generate impulses.

2. The momentary charge difference in the axon stimulates its adjacent parts.

3. Similar changes occur there also.

4. Impulses get transmitted through axon.

53. The sympathetic nervous system stimulates all body activities. Its activity helps the body to overcome emergency situations.

Do you agree with the statement? Justify your answer by citing suitable examples.

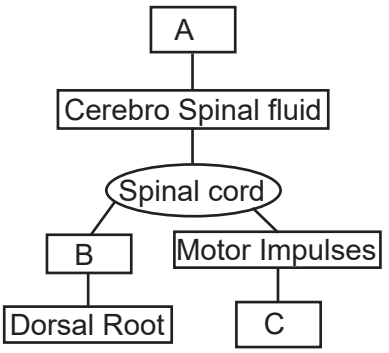
Ans. • Agree partially.

• Sympathetic system enables body to overcome emergency situations.

• Sympathetic system slows down certain body activities.

• Eg. Production of saliva decreases/slows down peristalsis. Slows down gastric activities.

54. Complete the following illustration.



Ans. A. Central canal.

B. Sensory impulses.

C. Ventral root.

55. The disease symptoms of two individuals are given below.

A	B
Loss of memory. Inability to recognise friends and relatives	Loss of body balance. Irregular movements of the muscles, shivering of the body

(a) Identify the diseases of individuals A and B.

(b) Explain the causes of diseases in individual A.

Ans. (a) A - Alzheimers. B – Parkinsons.

(b) 1. Accumulation of an insoluble protein in the neural tissues of the brain.

2. Neurons get destroyed.

56. Mohan lost his memory and was partially paralyzed after he met with an accident.

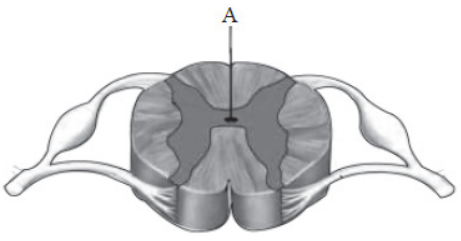
(a) Which part of Mohan's brain was affected?

(b) How is the brain protected?

Ans. (a) 1. Cerebrum. 2. Skull. 3. Meninges. 4. Cerebrospinal fluid.

(b) The brain is protected inside a hard skull and is covered by a three-layered membrane called the meninges. Cerebrospinal fluid a fluid formed inside the meninges also protects the brain.

57. Observe the picture and answer the following.



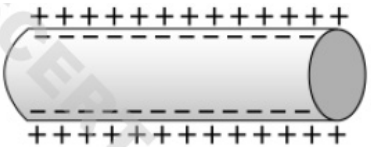
(a) Identify A.

(b) What are the peculiarities of the impulses which are transmitted through the dorsal root and the ventral root?

Ans. (a) A – central canal.

(b) 1. Dorsal root – sensory impulses. 2. Ventral root – motor impulses.

58. The following figure shows the distribution of ions on either side of the plasma membrane of the axon. Analyze the figure and answer the following.



(a) Why is there a difference in charge distribution on either side of the plasma membrane?

(b) What changes do the stimulus create in the charges on either side of the plasma membrane? How do these charges get transmitted through the axon as impulses?

Ans. (a) The difference in the distribution of ions.

(b) When stimulated, in that particular part, the outer surface of the plasma membrane becomes negatively charged while the inner surface becomes positively charged.

59. Draw the diagram and label the following parts.

(a) The part which secretes acetylcholine.

(b) The part which receives impulses from the adjacent neuron.

(c) The part which carries impulses from the cell body to outside.

Ans.

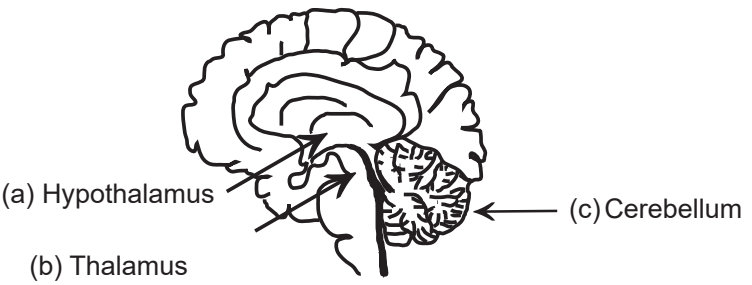
60. Draw the diagram and label the following parts.

(a) The part that helps in the maintenance of homeostasis

(b) That acts as relay station of impulses to and from the cerebrum.

(c) The second-largest part of the brain.

Ans.



61. Identify the correct statements from those given below:

(i) The central nervous system consists of the brain and the spinal cord.

(ii) The peripheral nervous system consists of 31 pairs of cranial nerves and 12 pairs of spinal nerves.

(iii) The sympathetic system and the parasympathetic system are parts of the central

nervous system.

(iv) The autonomous nervous system which is a part of the peripheral nervous system helps to overcome the emergency situations.

Ans. Correct statements : (i), (iv).

62. Identify the odd one. What is common about others?

(a) Touch, light, hunger, sound. (b) Brain, gland, nerves, spinal cord.

(c) Breathing, sight, intelligence, hearing.

Ans. (a) hunger – others are external stimuli.

(b) gland – others are parts of nervous system.

(c) breathing – others are controlled by cerebrum.

63. Box A and Box B contains the parts of the brain and related information respectively. Analyze the information in the boxes and complete the table as per the model "cited".

A	B
• Cerebellum • Hypothalamus • Medulla oblongata • Thalamus	• Situated behind the cerebrum • Controls involuntary actions • Maintains equilibrium of the body • Located near the cerebellum as a rod-shaped structure • Maintains homeostasis • Situated below the thalamus • Acts as relay station of impulses • Situated below the cerebrum

Part	Location	Function
Hypothalamus	Situated just below the thalamus	Maintains homeostasis
Thalamus		
Cerebellum		
Medulla oblongata		

Ans.

Part	Location	Function
Thalamus	Situated below the cerebrum	relay station of impulse
Cerebellum	behind the cerebrum	maintains equilibrium of the body
Medulla oblongata	seen as a rod-shaped structure near the cerebellum	controls involuntary actions

64. Identify the word pair relationship and fill in the blanks:

(i) Sensory nerves : Carries impulses to the spinal cord.

…….. : Carries impulses from the brain to various parts of the body.

(ii) Skull : Brain

…… : Spinal cord

(iii) Hypothalamus : Maintains homeostasis

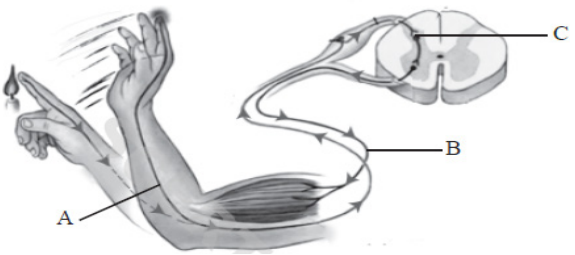
…… : Control center of involuntary actions.

(iv) Dendrite : Receives impulses

…… : Carries impulses outside

Ans. (i) Motor nerve. (ii) Vertebral column. (iii) Medulla oblongata. (iv) Axon.

65. Observe the illustration and answer the questions.



(a) Which action does the illustration depict?

(b) Identify A, B and C.

Ans. (a) reflex action.

(b) A – Sensory nerve. B – Motor nerve. C – Interneuron.

66. (Orukkam – 2017)

A	B
The leg is pulled back when its touch on a thorn.	Blink our eyes when suddenly come towards our eye.

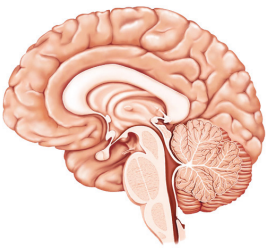
(a) How these responses are known as?

(b) Prepare a flowchart related to the pathway of impulses mentioned in A?

Ans. (a) Reflex Action

(b) Receptor generates impulses → sensory neuron → Interneuron → Motor neuron → Related muscles.

67. Redraw the picture, identify and label the parts which have the following functions.



A. (a) The part which controls involuntary actions.

(b) The part which coordinates muscular activities.

(c) The part which helps to feel senses.

(d) The part which acts as the relay station of impulses.

(e) The part which plays a major role in the maintenance of homeostasis.

B. Identify the parts of brain related to the following actions.

(a) Maintains the equilibrium of the body

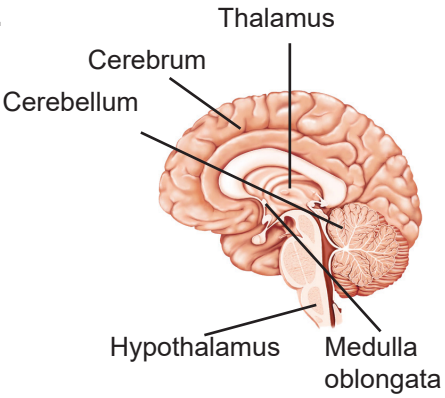
(b) Controls breathing

(c) The three-layered membrane which helps in the protection of brain.

(d) The production center of oxytocin and vasopressin

(e) Centre of thought, intelligence, and memory

Ans. A.



B. (a) – Cerebellum

(b) – Medulla oblongata.

(c) – Meninges.

(d) – Hypothalamus.

(e) – Cerebrum.

68. Write the different types of nerves and their functions like the example given below.

A. Mixed nerve	Carries impulses to and from the brain and spinal cord.
B.	.....
C.	.....

Ans. B. Sensory Nerve → Carries impulse to the brain and spinal cord from various sensory parts of the body.

C. Motor Nerve → Carries impulses from the brain and spinal cord to various parts of the body.

69. The symptoms of a disease that affecting nervous system is given below.

Loss of body balance, irregular movement of muscles, shivering of the body, profuse salivation

(a) Identify the disease. (b) Write the causes of the disease.

(c) Explain the other diseases that affecting nervous system with their cause and symptoms.

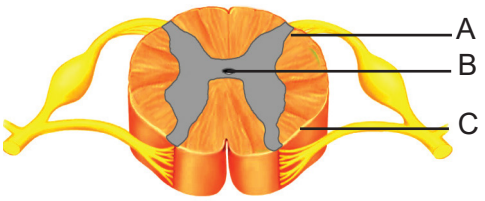
Ans. (a) Parkinsons

(b) Degeneration of specific ganglia in the brain due to decreased production of dopamine.

(c) 1. Alzheimer's: Loss of memory, Inability to recognize friends and relatives, Inability to do routine works.

2. Epilepsy: Continuous muscular contraction, frothy discharge from the mouth, clenching of teeth and falls unconscious.

70. Observe the figure and answer the questions given below.



(a) Identify the parts indicated as A, B, C?

(b) Write the name of the fluid-filled in B?

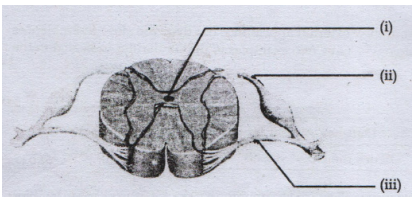
(c) How spinal cord is protected?

Ans. (a) A – Dorsal root. B – Central canal. C – Ventral root.

(b) Cerebrospinal fluid.

(c) Spinal cord is protected by a three-layered membrane meanings, filled with CSF, inside the spinal column.

71. Observe the illustration and answer the questions



(a) Identify the part labelled as (i)

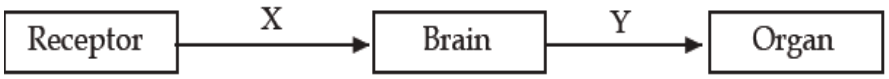
(b) What is the difference between the impulses transmitted through (ii) and (iii)?

Ans. a) Central canal

b) (i)Sensory impulses reach the spinal cord through the dorsal root.

(ii) Motor impulses go out of the spinal cord through the ventral root.

72. Observe the illustration on impulse transmission through nerves and answer the questions:



(a) What kind of nerves do 'X' and 'Y' indicate?

(b) What is the significance of synapse in impulse transmission?

Ans. (a) X sensory neuron, Y - Motor neuron

(b) Controls the speed and direction of impulses.

73. Analyse the situations given below and answer the questions.

(i) Withdraws the hand suddenly when one unknowingly touches a hot object.

(ii) Eyes blink when objects move towards them.

(a) What nerve action does the responses in Situations i and ii indicate?

(b) What are the control centres of these two nerve actions?

(c) What is the role of interneuron in the response of situation (i)?

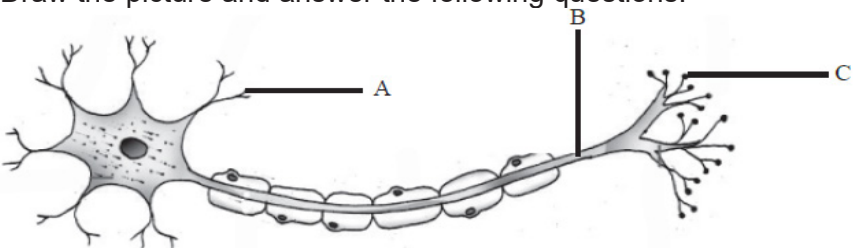
Ans. (a) Reflex action

(b) i - Spinal cord ii- Cerebrum/brain

(c) - Connects the sensory neuron and the motor neuron

- Generates quick responses according to the sensory impulses

74. Draw the picture and answer the following questions.



(a) Identify the parts A, B, and C.

(b) Write down the functions of these parts.

Ans. (a) A - Dendrite, B - Axon C - Synaptic knob

(b) A - Dendrite : Receives impulses from the adjacent neuron.

B - Axon : Carries impulses from the cell body to outside.

C - Synaptic knob : secretes neuron transmitter.

PREVIOUS YEAR QUESTIONS AND ANSWERS

1. Identify the part of brain which helps to maintain homeostasis.

(a) Cerebrum (b) Thalamus (c) Medulla oblongata (d) Hypothalamus **(2021)**

Ans. Hypothalamus

2. We withdraw our hand when accidently touch on a sharp object.

(a) What kind of response is mentioned here?

(b) Name two types of such responses. **(2021)**

Ans. a. Reflex Actions b. Cerebral reflex, Spinal reflex

3. Complete the following table appropriately. **(2021)**

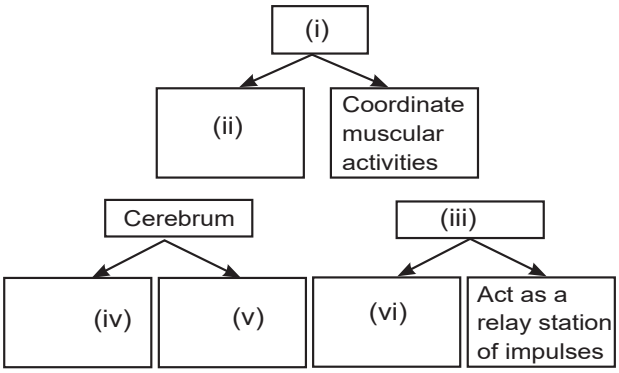
Symptoms	Causes	Disease
(i)	Production of dopamine in the brain gets reduced	(iii)
Loss of memory and inability to do routine works	(ii)	(iv)

Ans. (i) Loss of body balance. Tremor in muscles, flow of saliva

(ii) Continuous degeneration of neurons due to the accumulation of an insoluble protein

(iii) Parkinsons (iv) Alzheimer's

4. Complete the following illustration using appropriate statements given in the box. **(2021)**



- Maintain equilibrium of the body
- Cerebellum
- Evoke sensation.
- Centre of thought, intelligence, memmory and imagination.
- Thalamus
- Analyses impulses from various parts of the body and sends to the cerebrum.

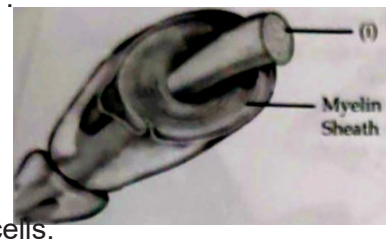
Ans. i. Cerebellum ii. Maintain the equilibrium of the body

iii. Thalamus iv. Centre of thought, intelligence, memory and imagination

v. Evoke sensation

vi. Analyses impulses from various parts of the body and send to cerebrum

6. Observe the picture and answer the following questions :



(a) Name the part indicated as (i)

(b) How does myelin sheath form? **(2020)**

Ans. (a) Axon

(b) Myelin sheath in the nerves is formed of Schwann cells.

Myelin sheath in the brain and the spinal cord is formed of specialized cells called oligodendrocytes.

7. Suitably arrange the information under the given heading. **(2020)**

• Evokes sensations.

• Co-ordinates the repeated movements during walking and running.

• Impulses from the different parts of the body are transmitted to and fro the brain.

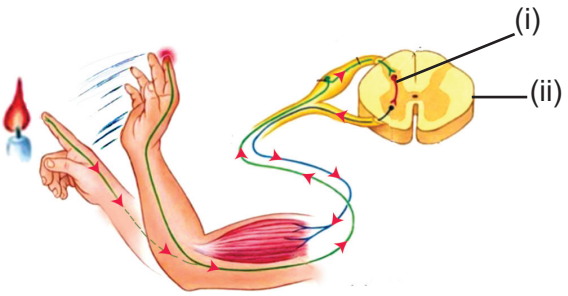
• Co-ordinates muscular activities and maintains equilibrium of the body.

Brain	Spinal cord
•	•
•	•

Ans.

Brain	Spinal cord
• Evoke sensation	• coordinates the repeated movements during walking, running
• Coordinates muscular activities and maintains equilibrium of the body.	• Impulses from different parts of the body are transmitted to and from brain through the spinal cord.

8. Analyse the illustration and answer the following questions:



(a) Write the names of (i) and (ii).

(b) Are all accidental responses controlled by (iii)? Explain with an example. **(2020)**

Ans. (a) i) Sensory neuron ii) Inter neuron

(b) No, all reflexes are not under the control of the spinal cord (iii)

We blink our eyes or when light suddenly falls on our eyes or when objects move towards the eye. Such reflexes under the control of cerebrum (cerebral reflex)

9. Tabulate the following activities based on the type of nervous system that controls, and give proper headings.

(a) Recognize smell of flowers. (b) Taking decisions at the emergency situations.

(c) Rate of heartbeat increases at times of crisis.

(d) Production of hormone decreases after overcoming the crisis. **(2016)**

Ans. (a) Central nervous system (b) Autonomous nervous system

(c) Sympathetic nervous system (d) Parasympathetic nervous system

10. Select the odd one. Write the common feature of others. **(2013)**

Axon, Nephron, Dendron, Dendrite.

Ans. Nephron. Others are parts of neuron.

11. Radha is moving away with fear from a snake. **(2013)**

(a) State what happens to the functioning of following organs?

Heart, Pupil, Trachea and Liver

(b) Which nervous system is activated during such emergency situation?

Ans. (a) Rate of heartbeat increases, Pupil dilates, Trachea dilates, Glycogen is converted into glucose within liver,

(b) Sympathetic system.

12. Find out 'Word pair relation' and fill in the blanks. **(2013)**

Eye – Vision Cerebellum – .....

Ans. To maintain body balance.

13. Find the odd one. Write down the common features of others. **(2013)**

Epilepsy, Parkinson's disease, Mumps, Alzheimer's disease.

Ans. Mumps – All others are the diseases caused by any kind of problems in brain.

14. Hypothalamus has an important role in maintaining homeostasis. Analyze this statement and note down 4 ideas to justify your views. **(2012)**

Ans. Hypothalamus produces certain neurosecretory hormones which influence the production of various stimulating hormones secreted by the pituitary gland. These hormones, in turn, stimulate the production of hormones of certain other important endocrine glands. Pituitary glands stimulate the glands to produce the hormones only according to the need of the body.

So hypothalamus indirectly helps in maintaining homeostasis. For example, during summer when water has to be retained in the body vasopressin is produced which will enhance the reabsorption of water from urine and they maintain the water level in the body. Calcium level is also maintained by the decrease and increase production of calcitonin and parathormone. In short

- Changes in the internal environment affects the rhythm of life activities.
- Secretion of hormones is increased or decreased according to the changes
- Life activities are regularised this way.
- Thus hypothalamus prepares the body to overcome different situations and maintain a normal balance.

15. Segregate the appropriate statements from column (A) as the functions of

(B) sympathetic and (C) Parasyampathic nervous system. **(2012)**

A
(a) Pupil constricts
(b) Decreases abdominal activities
(c) Conversion of glycogen to glucose
(d) Peristalsis slows down
(e) Secretion of saliva increase
(f) Increases breathing

B

C

Ans. (B) Sympathetic nervous system:

- Decreases abdominal activities.
- Conversion of glycogen to glucose.
- Peristalsis slows down.
- Increases breathing.

(C) Parasympathetic nervous system:

- Pupil constricts
- Secretion of saliva increases