Chapter - 7
Control and Coordination

Multiple Choice Questions

1. Which of the following statements is correct about receptors?
(a) Gustatory receptors detect taste while olfactory receptors detect smell
(b) Both gustatory and olfactory receptors detect smell
(c) Auditory receptors detect smell and olfactory receptors detect taste
(d) Olfactory receptors detect taste and gustatory receptors smell

Soln:

Answer is (a) Gustatory receptors detect taste while olfactory receptors detect smell

Explanation:

A receptor is a cell which is sensitive for the external stimulus such as light,taste, smell. Ex: Photoreceptors detect light.Gustatory receptors detect taste. Olfactory receptors detects smell.

2. Electrical impulse travels in a neuron from
(a) Dendrite → axon → axonal end → cell body
(b) Cell body → dendrite → axon → axonal end
(c) Dendrite → cell body → axon → axonal end
(d) Axonal end → axon → cell body → dendrite

Soln:

Answer is (c) Dendrite → cell body → axon → axonal end

Explanation:

Stimulus is received by dendrites which are transmitted to cyton through axon . Stimulus reaches the terminal branches called as axonal end from where they are transmitted to another neuron.

3. In a synapse, chemical signal is transmitted from
(a) dendritic end of one neuron to axonal end of another neuron
(b) axon to cell body of the same neuron
(c) cell body to axonal end of the same neuron
(d) axonal end of one neuron to dendritic end of another neuron

Soln:

Answer is (d) axonal end of one neuron to dendritic end of another neuron

Explanation:

Electric impulse travel from the axon to the dendrite of another neuron through a synaptic gap which consist of SYNAPSE.

4. In a neuron, conversion of electrical signal to a chemical signal occurs at/in
(a) cell body
(b) axonal end
(c) dendritic end
(d) axon

Soln:

Answer is (b) axonal end

Explanation:

At axonal end electric impulse triggers the release of neurotransmitter. These chemicals eneter dendrite of another neuron to transmit the signal.

5. Which is the correct sequence of the components of a reflex arc?
(a) Receptors→ Muscles→ Sensory neuron→ Motor neuron→ Spinal cord
(b) Receptors→ Motor neuron → Spinal cord → Sensory neuron → Muscle
(c) Receptors → Spinal cord → Sensory neuron → Motor neuron → Muscle
(d) Receptors → Sensory neuron → Spinal cord → Motor neuron → Muscle

Soln:

Answer is (d) Receptors → Sensory neuron → Spinal cord → Motor neuron → Muscle

Explanation:

Sensory neurons receive signals from receptors. These signals are sent to spinal cord which reaches Muscles through motor neuron.

6. Which of the following statements are true?
(i) Sudden action in response to something in the environment is called reflex action
(ii) Sensory neurons carry signals from spinal cord to muscles
(iii) Motor neurons carry signals from receptors to spinal cord
(iv) The path through which signals are transmitted from a receptor to a muscle or a gland is called reflex arc

(a) (i) and (ii)
(b) (i) and (iii)
(c) (i) and (iv)
(d) (i) , (ii) and (iii)

Soln:

Answer is (c) (i) and (iv)

Explanation:

Sensory neurons carry signals from muscles to spinal cord hence statement ii) and iv) are wrong statements.

7. Which of the following statements are true about the brain?
(i) The main thinking part of brain is hind brain
(ii) Centres of hearing, smell, memory, sight etc are located in fore brain.
(iii) Involuntary actions like salivation, vomiting, blood pressure are controlled by the medulla in the hind brain
(iv) Cerebellum does not control posture and balance of the body

(a) (i) and (ii)
(b) (i), (ii) and (iii)
(c) (ii) and (iii)
(d) (iii) and (iv)

Soln:

Answer is (c) (ii) and (iii)

Explanation:

Forebrain is the thinking part of brain hence statement i) is wrong. Cerebellum control posture and balance of the body hence statement iv) is wrong

8. Posture and balance of the body is controlled by
(a) cerebrum
(b) cerebellum
(c) medulla
(d) pons

Soln:

Answer is (b) cerebellum

Explanation:

Cerebrum is responsible for sensory processing. Medulla controls involuntary functions. Pons regulates respiration and controls involuntary actions sensations such as touch and pain.

9. Spinal cord originates from
(a) cerebrum
(b) medulla
(c) pons
(d) cerebellum

Soln:

Answer is (b) medulla

10. The movement of shoot towards light is
(a) geotropism
(b) hydrotropism
(c) chemotropism
(d) phototropism

Soln:

Answer is (d) phototropism

Explanation:

Growth of plant roots towards or away from moisture is called hydrotropism. Plant growth in response to gravitational force is called as geotropism. Growth of plant in response to chemical stimulus is called chemotropism.

11. The main function of abscisic acid in plants is to
(a) increase the length of cells
(b) promote cell division
(c) inhibit growth
(d) promote growth of stem

Soln:

Answer is (c) inhibit growth

Explanation:

Auxins increase the length of cells. Cytokinins promote cell division. Gibberlins promote growth of stem.

12. Which of the following is not associated with growth of plant?
(a) Auxin
(b) Gibberellins
(c) Cytokinins
(d) Abscisic acid

Soln:

Answer is (d) Abscisic acid

Explanation:

Abscisic acid inhibit the growth of plant hence it is not associated with growth of plant.

13. Iodine is necessary for the synthesis of which hormone?
(a) Adrenaline
(b) Thyroxin
(c) Auxin
(d) Insulin

Soln:

Answer is (b) Thyroxin

14. Choose the incorrect statement about insulin
(a) It is produced from pancreas
(b) It regulates growth and development of the body
(c) It regulates blood sugar level
(d) Insufficient secretion of insulin will cause diabetes

Soln:

Answer is (b) It regulates growth and development of the body

15. Select the mis-matched pair
(a) Adrenaline : Pituitary gland
(b) Testosterone: Testes
(c) Estrogen : Ovary
(d) Thyroxin : Thyroid gland

Soln:

Answer is (a) Adrenaline : Pituitary gland

Explanation:

Adrenaline is secreted by Adrenal gland and Pitutary gland produces TSH, FSH and GSH hormones.

16. The shape of guard cells changes due to change in the
(a) protein composition of cells
(b) temperature of cells
(c) amount of water in cells
(d) position of nucleus in the cells

Soln:

Answer is (c) amount of water in cells

Explanation:

Excess of water will turn guard cells turgid and loss of water turn guard cells flaccid.

17. The growth of tendril in pea plants is due to
(a) effect of light
(b) effect of gravity
(c) rapid cell divisions in tendrillar cells that are away from the support
(d) rapid cell divisions in tendrillar cells in contact with the support

Soln:

Answer is (c) rapid cell divisions in tendrillar cells that are away from the support

18. The growth of pollen tubes towards ovules is due to
(a) hydrotropism
(b) chemotropism
(c) geotropism
(d) phototropism

Soln:

Answer is (b) chemotropism

Explanation:

Chemicals released by ovules stimulate the growth of pollen tubes towards ovules.

19. The movement of sunflower in accordance with the path of sun is due to
(a) phototropism
(b) geotropism
(c) chemotropism
(d) hydrotropism

Soln:

Answer is (a) phototropism

Explanation:

The movement of shoot towards light is called phototropism.
Plant growth in response to gravitational force is called as geotropism .
Growth of plant in response to chemical stimulus is called chemotropism.
Growth of plant roots towards or away from moisture is called hydrotropism.

20. The substance that triggers the fall of mature leaves and fruits from plants is due to
(a) auxin
(b) gibberellin
(c) abscisic acid
(d) cytokinin

Soln:

Answer is (c) abscisic acid

Explanation:

abscisic acid forms a layer of abscission. This layer disconnect the living tissue of leaf from the other parts.

21.Which of the following statements about transmission of nerve impulse is incorrect?
(a) Nerve impulse travels from dendritic end towards axonal end
(b) At the dendritic end electrical impulses bring about the release of some chemicals which generate an electrical impulse at the axonal end of another neuron
(c) The chemicals released from the axonal end of one neuron cross the synapse and generate a similar electrical impulse in a dendrite of another neuron
(d) A neuron transmits electrical impulses not only to another neuron but also to muscle and gland cells

Soln:

Answer is (b) At the dendritic end electrical impulses bring about the release of some chemicals which generate an electrical impulse at the axonal end of another neuron

Explanation:

Chemicals or neurotransmitters are released at axonal end not on dendritic end. Hence statement b) is incorrect

22. Involuntary actions in the body are controlled by
(a) medulla in fore brain
(b) medulla in mid brain
(c) medulla in hind brain
(d) medulla in spinal cord

Soln:

Answer is (c) medulla in hind brain

Explanation:

Medulla is present only in hind brain

23. Which of the following is not an involuntary action?
(a) Vomiting
(b) Salivation
(c) Heart beat
(d) Chewing

Explanation:

Answer is (d) Chewing

24. When a person is suffering from severe cold, he or she cannot
(a) differentiate the taste of an apple from that of an ice cream
(b) differentiate the smell of a perfume from that of an agarbatti
(c) differentiate red light from green light
(d) differentiate a hot object from a cold object

Soln:

Answer is (b) differentiate the smell of a perfume from that of an agarbatti

Explanation:

During cold olfactory receptors gets blocked hence we cannot differentiate smell.

25. What is the correct direction of flow of electrical impulses?

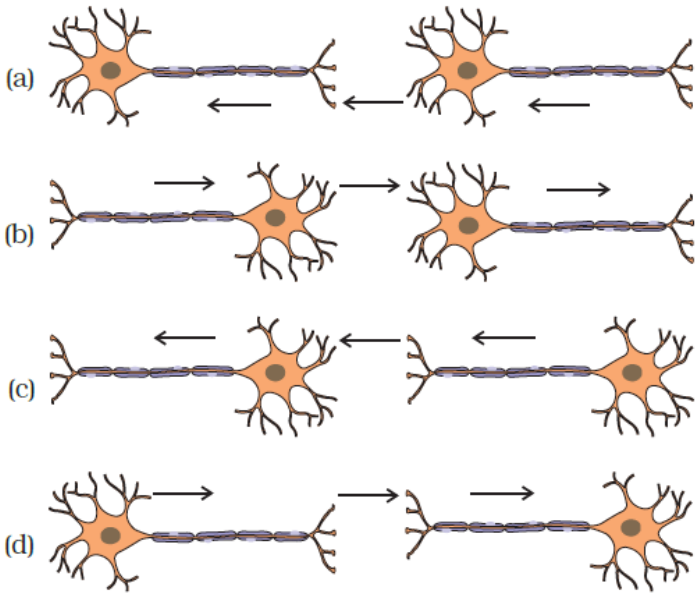


Fig. 7.1

Soln:

Answer is c)

Explanation:

Dendrites of a neuron receive electrical impulse from axonal end of another neuron. After that, electrical impulse travels through cell body, axon; to the axonal end.

26. Which statement is not true about thyroxin?
(a) Iron is essential for the synthesis of thyroxin
(b) It regulates carbohydrates, protein and fat metabolism in the body
(c) Thyroid gland requires iodine to synthesise thyroxin
(d) Thyroxin is also called thyroid hormone

Soln:

Answer is (a) Iron is essential for the synthesis of thyroxin

Explanation:

Iodine is essential for the synthesis of thyroxin but not iron hence statement a) is wrong

27. Dwarfism results due to
(a) Excess secretion of thyroxin
(b) Less secretion of growth hormone
(c) Less secretion of adrenaline
(d) Excess secretion of growth hormone

Soln:

Answer is (b) Less secretion of growth hormone

Explanation:

Growth hormones are responsible for the overall growth of an organism. When there will be no secretion of growth hormones it leads to dwarfism.

28. Dramatic changes of body features associated with puberty are mainly because of secretion of

(a) oestrogen from testes and testosterone from ovary
(b) estrogen from adrenal gland and testosterone from pituitary gland
(c) testosterone from testes and estrogen from ovary
(d) testosterone from thyroid gland and estrogen from pituitary gland

Soln:

Answer is (c) testosterone from testes and estrogen from ovary

Explanation:

These are the sex hormones responsible for the secondary character that appear after puberty. Males secrete testosterone and females secrete estrogen.

29. A doctor advised a person to take an injection of insulin because
(a) his blood pressure was low
(b) his heart was beating slowly
(c) he was suffering from goitre
(d) his sugar level in blood was high

Soln:

Answer is (d) his sugar level in blood was high

Explanation:

Patient suffering from diabetes will have high blood glucose due to non-functioning or lack of insulin hormone. Such patients are administered with insulin injection to regulate blood glucose.

30. The hormone which increases the fertility in males is called
(a) oestrogen
(b) testosterone
(c) insulin
(d) growth hormone

Soln:

Answer is (b) testosterone

31. Which of the following endocrine glands is unpaired?
(a) Adrenal
(b) Testes
(c) Pituitary
(d) Ovary

Soln:

Answer is (c) Pituitary

Explanation:

Adrenal glands are two which are present on top of each kidney. Testes is a paired gland in males which produces male sex hormones. Ovary is a paired gland in females which produces female sex hormones. Pitutary gland is an independent gland present below the brain. It is called as master gland as it secretes major of the hormones.

32. Junction between two neurons is called
(a) cell junction
(b) neuro muscular junction
(c) neural joint
(d) synapse

Soln:
Answer is (d) synapse

Explanation:

A synapse is a structure that allows a neuron to pass an electric signal to the next neuron or effector cell. Hence it is a junction between two neurons.

33. In humans, the life processes are controlled and regulated by
(a) reproductive and endocrine systems
(b) respiratory and nervous systems
(c) endocrine and digestive systems
(d) nervous and endocrine systems

Soln:

Answer is (d) nervous and endocrine systems

Explanation :

Reproductive, respiratory and digestive systems have no role to play in control and regulation of life processes. It is the nervous system and the endocrine system that control and regulates all the processes including Reproductive, respiratory and digestive systems.

Short Answer Questions

34. Label the parts (a), (b), (c) and (d) and show the direction of flow of electrical signals in Figure 7.2.

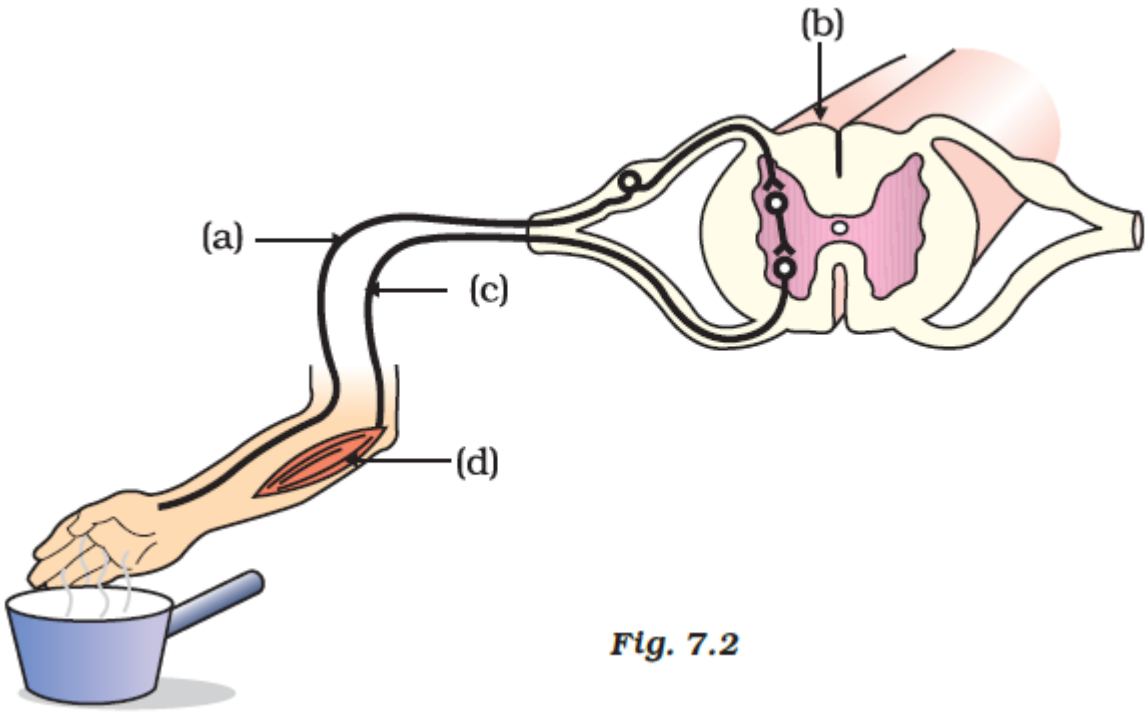


Fig. 7.2

Soln:

a) **Sensory neuron**
b) **Spinal cord**
c) **Motor neuron**
d) **Muscle**

35. Name the plant hormones responsible for the following
(a) elongation of cells
(b) growth of stem
(c) promotion of cell division
(d) falling of senescent leaves.

Soln:

a) Auxin
b) Gibberlin
c) Cytokinin
d) Abscisic acid

36. Label the endocrine glands in Figure 7.3.

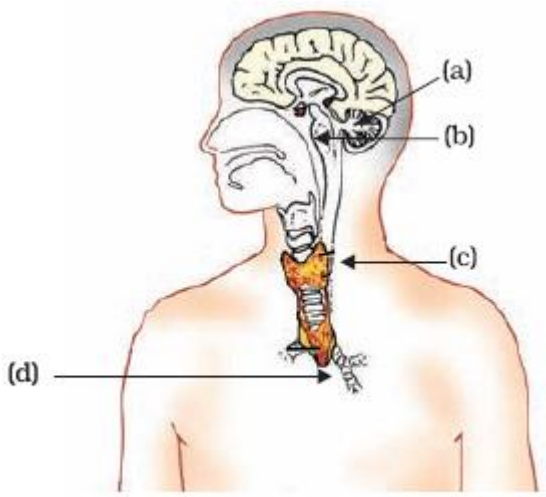


Fig. 7.3

Soln:

a) Pineal Gland
b) Pitutary gland
c) Thyroid gland
d) Thymus

37. In Figure 7.4 (a), (b) and (c), which appears more accurate and why?

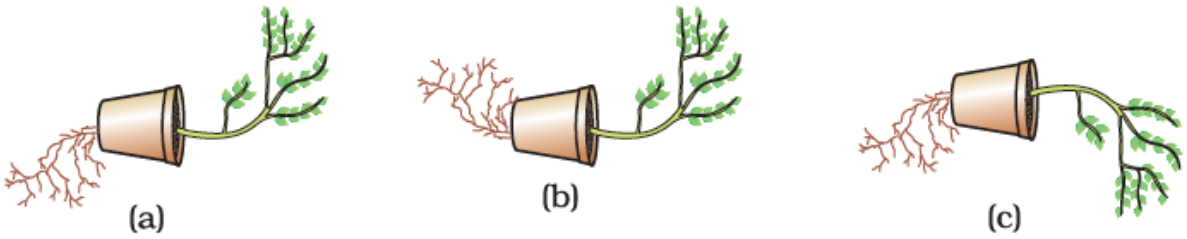
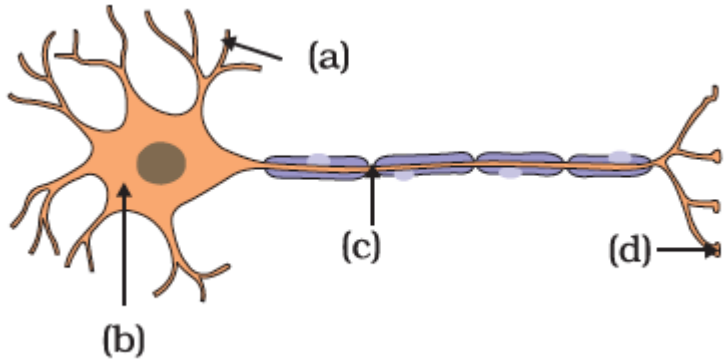


Fig. 7.4

Soln:

Figure a) is more accurate because in figure a plant root shows positive geotrophism and shoot shows positive phototrophism.

38. Label the parts of a neuron in Figure 7.5.



Soln:

a) Dendrite
b) Cellbody
c) Axon
d) Axon terminal

39. Match the terms of Column (A) with those of Column (B)

Column A	**Column B**
(a) Olfactory receptors	**(i) Tongue**
(b) Thermo receptors (temperature receptors)	**(ii) Eye**
(c) Gustatoreceptors	**(iii) Nose**
(d) Photoreceptors	**(iv) Skin**

Soln:

Column A	Column B
(a) Olfactory receptors	(iii) Nose
(b) Thermo receptors (temperature receptors)	(iv) Skin
(c) Gustatoreceptors	(i) Tongue
(d) Photoreceptors	(ii) Eye

40. What is a tropic movement? Explain with an example.

Soln:

Directional growth movement of a plant due to external stimulus is called as tropic movement. Movement can be either toward the stimulus or away from stimulus. Ex: Roots shows positive geotropic movement and they grow with direction of gravity whereas shoots shows negative geotropic movement.

41. What will happen if intake of iodine in our diet is low?

Iodine is essential for the synthesis of hormone thyroxin. If we take low iodine diet it leads to hypo thyroidism which results in a disease called as goiter.

42. What happens at the synapse between two neurons?

Soln:

At Synapse nerve impulse of a nerve cell gets converted to neurotransmitters which travels towards dendrites of next neuron leading to electric impulse.

43. Answer the following :
(a) Which hormone is responsible for the changes noticed in females at puberty?
(b) Dwarfism results due to deficiency of which hormone?
(c) Blood sugar level rises due to deficiency of which hormone?
(d) Iodine is necessary for the synthesis of which hormone?

Soln:

a) **Oestrogen** hormone is responsible for the changes noticed in females at puberty

b) Dwarfism results due to deficiency of **Growth Hormones.**

c) Blood sugar level rises due to deficiency of **Insulin** Hormone

d) Iodine is necessary for the synthesis of **Thyroxine** Hormone

44. Answer the following :
(a) Name the endocrine gland associated with brain?
(b) Which gland secretes digestive enzymes as well as hormones?
(c) Name the endocrine gland associated with kidneys?
(d) Which endocrine gland is present in males but not in females?

Soln:

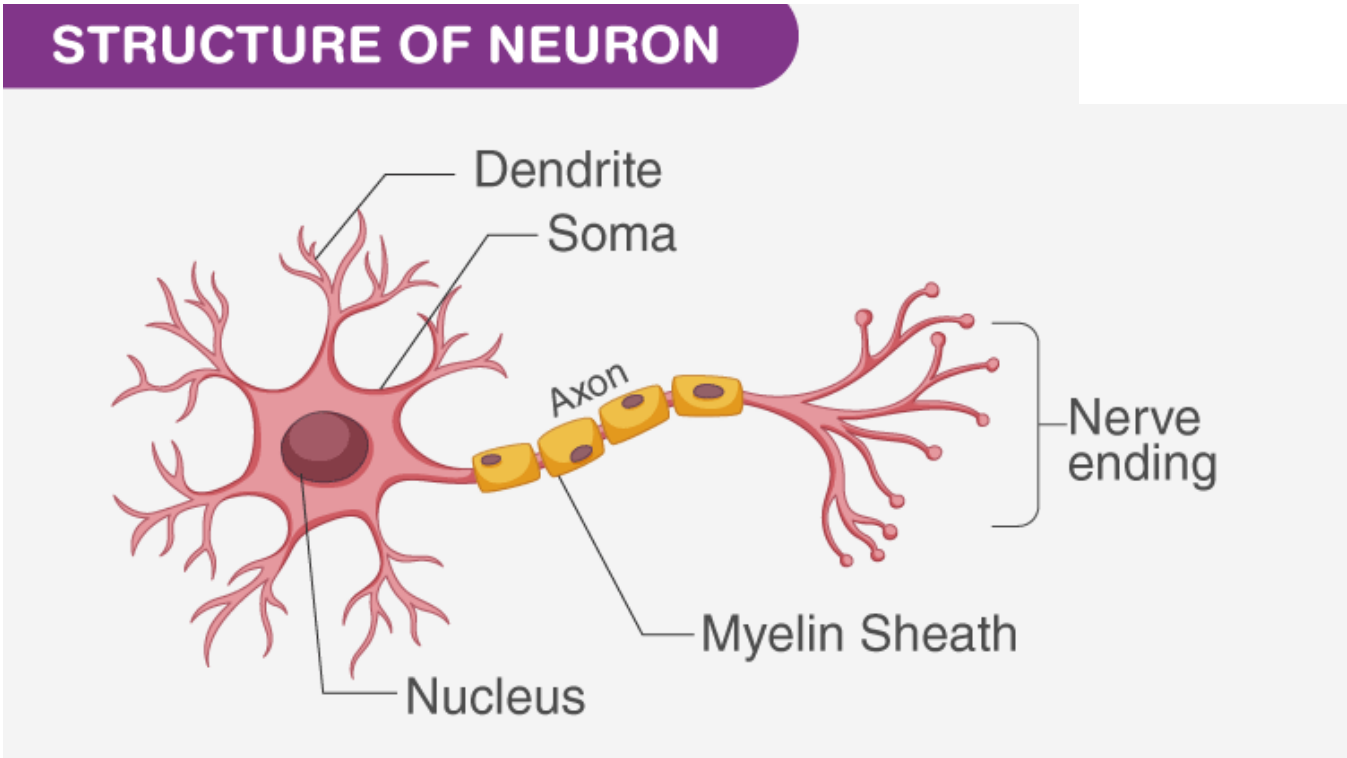
a) Pitutary gland is associated with brain
b) Pancreas secretes digestive enzymes as well as hormones
c) Adrenal gland is associated with kidneys
d) Testis is present in males but not in females

Long Answer Questions

45. Draw the structure of a neuron and explain its function.

Soln:

Neuron is highly specialized cell responsible for the transmission of nerve impulse.



Soma or cellbody is a star shaped hair like structure Hair like structures are called as dendrites. Dendrites receives nerve impulses.

Axon is the tail of the nucleus it ends in hair like structures which makes nerve endings. Nerve endings relay nerve impulses.

Mylein sheath acts as an insulator around the axon. It insulates axons from the electrical impulses from the surroundings.

Function of neuron is to process and transmit information from brain to all parts of the body.

46. What are the major parts of the brain? Mention the functions of different parts.

Soln:

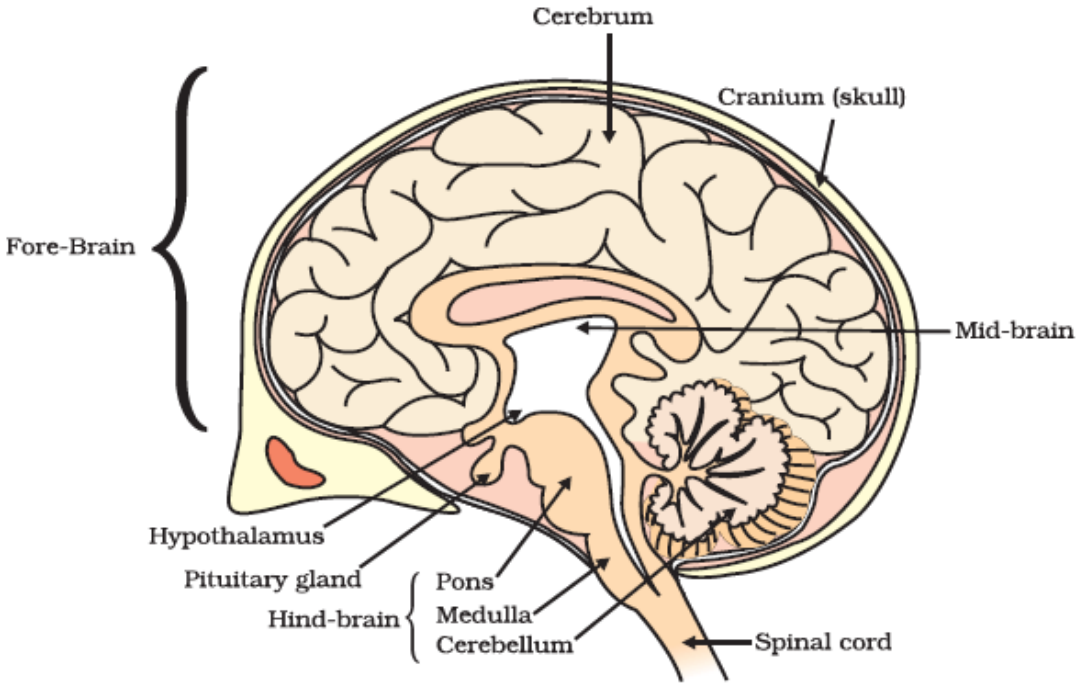


Figure 7.3 *Human brain*

Functions of brain Parts

Forebrain:

The fore-brain is the main thinking part of the brain. It has regions which receive sensory impulses from various receptors. Separate areas of the fore-brain are specialised for hearing, smell, sight and so on.

Mid brain and Hind brain:

Involuntary actions are controlled by the mid-brain and hind-brain.

Cerebellum:

Responsible for voluntary actions and maintaining the posture and balance of the body.

Cerebrum:

Cerebrum is responsible for sensory processing.

Medulla:

Medulla controls involuntary functions.

Pons:

Pons regulates respiration and controls involuntary actions sensations such as touch and pain.

Hypothalamus:

Hypothalamus control sleep and wake cycle

47. What constitutes the central and peripheral nervous systems? How are the components of central nervous system protected?

Soln:

Central nervous system comprises of brain and spinal cord. Peripheral nervous system is composed of nerves which are outside the spinal cord.

Central nervous system has a well-developed system for its protection. Brain is enclosed in a hard shell know as skull. Spinal cord is enclosed in vertebral column for its protection. Along with these there is cerebrospinal fluid which protects the brain from mechanical shocks.

48. Mention one function for each of these hormones :
(a) Thyroxin
(b) Insulin
(c) Adrenaline
(d) Growth hormone
(e) Testosterone.

Soln:

Thyroxin:

Thyroxin regulates carbohydrate, protein and fat metabolism in the body so as to provide the best balance for growth.

Insulin:

Insulin regulates blood glucose levels. If insulin not secreted in an appropriate level it leads to rise in blood glucose level which results in many adverse effects on life processes.

Adrenaline:

Adrenaline prepares our body for emergency situations. Adrenaline is also called as fight and flight hormone.

Growth Hormone:

Growth hormone is responsible for the growth and regulation of growth.

Testosterone:

Testosterone is responsible for the expression of secondary sexual characters in the body.

49. Name various plant hormones. Also give their physiological effects on plant growth and development.

Soln:

a) Auxin- responsible for elongation of cells
b) Gibberlin- responsible for growth of stem and thereby increases girth of stem
c) Cytokinin promotes cell division in plants
d) Abscisic acid stops growth of the plant and it makes leaves and fruits fall from plant.

50. What are reflex actions? Give two examples. Explain a reflex arc.

The sudden involuntary movement in a voluntary organ; in response to a stimulus; is called reflex action.

Examples of reflex action:
(a) Moving your hand away from a hot iron plate
(b) Blinking of eyes

Reflex Arc.

Reflex arc is a path of electrical impulse during a reflex action. It is composed of sensory neuron, spinal cord, motor neuron and muscle.

Steps of reflex arc

• The sensory neuron picks signals from the stimulus and carries the signals to the spinal cord.
• Spinal cord process the signals and sends message through the motor neuron.
• Motor neuron transmits the signals to the effector muscle so that the muscle can take immediate action.

51. “Nervous and hormonal systems together perform the function of control and coordination in human beings.” Justify the statement.

Control and coordination in human beings is under the influence of nervous system . Brain control all the organelles and organ system. The control is obtained by network of neurons which carry signals through neurotransmitters in the form of electric impulses to the brain and from the brain.

Hormonal system consist of varieties of hormones secreted by various glands in our body. Hormonal system coordinates the function of nervous system. Hormones indirectly control the life processes by feedback mechanism. They can produce hormones when required and can stop production when not required.

52. How does chemical coordination take place in animals?

Soln:

Chemical coordination takes place in animals through hormones produced by glands present in animals. Hormones are directly released into blood stream to reach the target site. Hormones control the behavior of the target tissue.

Example:

Adrenal gland secretes Adrenalin which reaches the heart, lungs and Gastro intestinal tract. Heart speeds up its pumping action so that more blood could be supplied to the limbs and facial muscles. But activity of the GI tract is slowed down to ensure better blood supply in limbs. Thus, adrenalin prepares the body for a fight or flight situation.

53. Why is the flow of signals in a synapse from axonal end of one neuron to dendritic end of another neuron but not the reverse?

Soln:

Electrical impulse travels through a neuron. But to be transmitted to another neuron, it need to be passed in the form of neurotransmitters. Neurotransmitters are specialized chemicals. They can enter a neuron only through specialized channels. Such channels are present in dendrites but not in axon. On the other hand, a neurotransmitter can enter a dendrite. Due to this, the flow of signals in a synapse is from axonal end of one neuron to dendritic end of another neuron but not the reverse.