Control and Coordination

Periodic Test

Q.1. How is shoot response different from root response?

Answer: Shoots of a plant always grow upwards i.e. they grow away from the earth whereas the roots of a plant grow downwards in the earth i.e. they grow towards the earth.

Q.2. A young plant receives sunlight from one direction only. What will happen to its shoots and roots?

Answer: The shoots will move towards the direction of sunlight and roots will move away from the sunlight.

Q.3. Name the main hormone secreted by adrenal glands? Give its function.

Answer: Adrenaline is the hormone secreted by adrenal glands.

Following are its functions:

- It acts on heart and due to this heart starts beating faster. Due to this fast beating more blood is supplied to muscles and ultimately they get more oxygen.
- The blood supply is diverted from digestive system and skin due to contraction of muscles around these small arteries.
- Breathing rate is also increased due to contraction of diaphragm and ribs.

All these functions then contribute to fight a person with difficult situations and to deal with them.

Q.4. Where is growth hormone synthesized in case of: (a) man (b) plants?

Answer: (a) Growth hormone is synthesized in Pituitary glands in case of man.

(b) Growth hormone is synthesized in plants at the tip of the shoot.

Q.5. Name one plant hormone which:

(a) Retards growth burning extremely dry season?

(b) Is present in greater concentration in fruits and seeds?

Answer: (a) Abscisic acid is the hormone in the plants that stop the growth during extremely dry season.

(b) Cytokinins are present in greater concentration in fruits and seeds.

Q.6. What does role brain play during reflex action?

Answer: Brain receives the information from different neurons which are connected in spinal cord and then after thinking process brains sends signals to muscles for further movement.

Q.7. What are phytohormones?

Answer: Hormones secreted by plants are known as phytohormones.

Q.8. Expand ABA, giving its function.

Answer: ABA- Abscisic acid

Function- Abscisic acid is the hormone which restricts the growth of the plant. Due to this hormone wilting of leaves occurs.

Q.9. Why the use of iodised salt advisable?

Answer: Iodised salt provides iodine. Iodine is very much essential for the synthesis of thyroxine hormone. This thyroxine hormone is necessary for regulation of the metabolism carbohydrates, proteins and fats and thus balances the growth. If there is lack of iodine in our body enough thyroxine is not synthesised and the person suffers from goitre.

Therefore, it is always advised to take iodised salt.

Q.10. What is the advantage of chemotropism in plants?

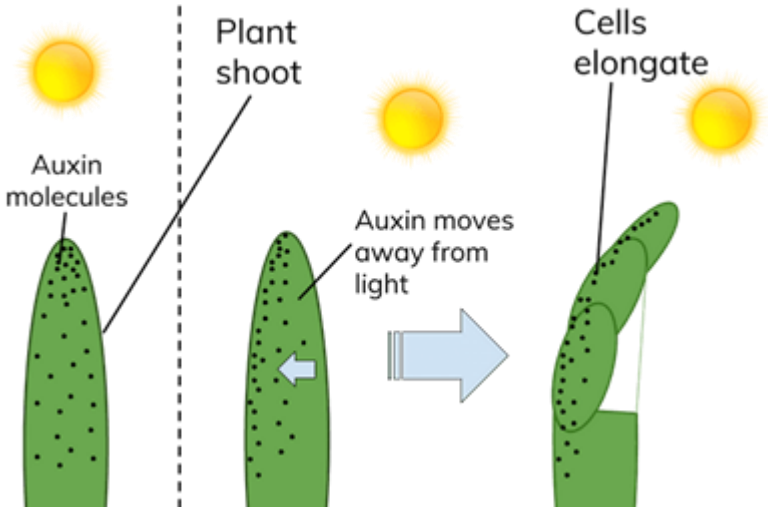
Answer: Chemotropism in the plants led to the growth of pollen tubes towards the ovules and thus helps in fertilisation of plants and helps in reproduction process.

Q.11. Name the plant growth hormone which is synthesised at the shoot tip. Explain the fact that, shoot of a plant bends towards the light during its growth. Why?

Answer: Auxin is the plant growth hormone that is synthesized at the shoot tip.

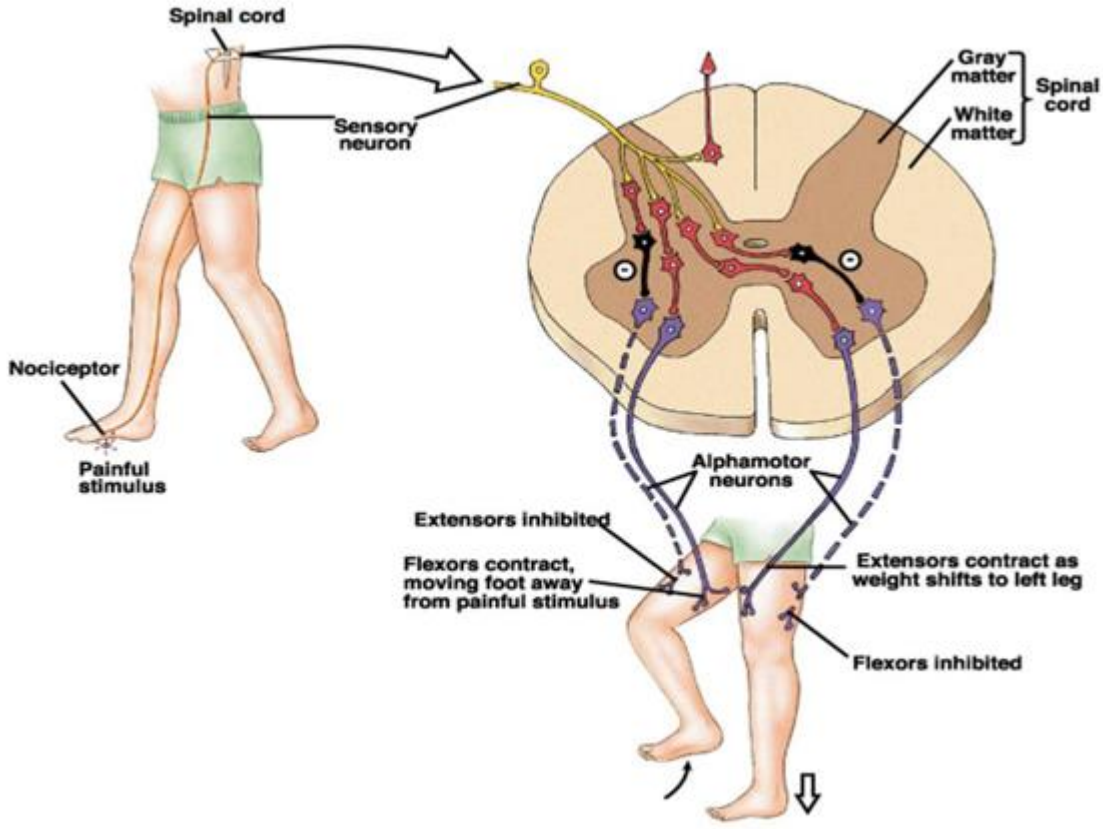
Yes, it is true that shoot of a plant bends towards the light during its growth and it is due to the presence of this auxin growth hormone. In the presence of sunlight, the auxin present in the stem starts breaking down due to which the concentration of auxin in the stem which is away from sunlight is more while those part of stem which is towards sunlight has low level of auxin. The cells with high level of auxin grow and the part having low level of auxin does not grow and therefore, stem of growing plant bend toward sunlight.

Following picture depicts the phenomenon:



Q.12. With the help of a diagram trace the events occurring when you step on a sharp object. Name this art.

Answer: This art is known as reflex action. Following is the diagram that traces the events of reflex action:



Q.13. Name the parts of brain which control the following activities:

(i) Riding bicycle (ii) Centre associated with hunger (iii) Swallowing (iv) Visual analysis.

Answer: (i) Riding bicycle- Cerebellum which is a part of hindbrain controls riding of cycle.

(ii) Centre associated with hunger- Hypothalamus part of forebrain is the center associated with hunger.

(iii) Swallowing- Medulla oblongata of hindbrain is associated with the swallowing process.

(iv) Visual analysis- Forebrain is associated with the visual- analysis.

Q.14. What are hormones? Name the hormone secreted by thyroid and state its function.

Answer: Hormones are the chemical messengers which are directly secreted into blood by ductless glands also known as endocrine gland and act on different distant organs.

Thyroxine is the hormone secreted by the thyroid gland. This hormone regulates the metabolism of carbohydrates, fats and proteins. By regulating the metabolism it provides best balanced growth to the body.

Q.15. What are 'nastic' and 'curvature' movements? Give one example of each.

Answer: Nastic movements- These are nondirectional movements which takes place in living parts of plant due to the stimulus like temperature, amount of water etc.

For example- Whenever there is excess amount of water stomata gets opened. This is a nondirectional movement which takes place due to presence of excess water.

Curvature movements- These are directional movements which take place due to stimulus like light, some chemicals etc.

For example- Shoot of a plant moves toward the direction of light. Here the movement is directional due to presence of light in a particular direction.

Q.16. What happens at the synapse between two neurons?

Answer: Transmission of impulse from one neuron to the other takes place at the synapse between two neurons.

Q.17. Name the two main organs of our central nervous system. Which one of them plays a major role in sending command to muscles to act without involving thinking process. Name the phenomenon involved.

Answer: Brain and spinal cord are the two main organs of central nervous system.

Spinal cord plays a major role in sending command to muscles to act without involving thinking process.

The phenomenon involved is reflex action.

Q. 18. Name and explain the function of the hormone secreted by the pituitary gland in humans.

Answer: Hormone secreted by pituitary gland- Growth hormone

Function of growth hormone- This growth regulates the growth and development of body.

Q.19. What is the difference between reflex action and walking?

Answer: Walking is a voluntary action which does not require any stimulus to proceed and involves thinking process whereas reflex action is the action which takes place in response to certain stimulus like touch to the burning object, and it does not involve thinking process. This action takes place in very small time and does not involve thinking. No time period is associated with walking, it completely depends on the person's choice.

Q.20. What is phototropism? Describe an activity to demonstrate phototropism.

Answer: Phototropism- It is the change in movement of plant that takes place due to the presence of light.

Following activity can be performed in order to observe

Phototropism:

- Take a small plant grown in a conical flask filled with water.
- Place it into a cardboard box which is open from one side.
- Now, place it near a window in such a way that the open side of the cardboard is towards the window from where light will come.
- Allow it to be there for 3-4 days.
- Now observe for the change in the plant.
- Change in the movement of shoot and root will be observed. The shoot will move towards the sunlight and root will move away from it.

Q.21. Give differences between: (a) Involuntary action and reflex action. (b) Tropic movements and Nastic movements.

Answer: (a)

Involuntary action	Reflex action
They do not require any kind of stimulus to act.	Stimulus is required for reflex action to take place.
Involuntary actions do not rely on spinal cord for them to take place.	Reflex action involves both brain and spinal cord.
Involuntary actions do not involve skeletal muscles.	Reflex action involves skeletal muscles.

(b)

Tropic movements	Nastic movements
They are a kind of directional movements.	They are non- directional movements.
These movements affect the growth of the plant.	They are not associated with the growth of the plant.
These movements are non-reversible in nature. They are permanent kind of.	These movements are reversible in nature. They are not permanent.
For example- Bending of shoot of plant towards the direction of light.	For example- Opening and closing of stomata according to amount of water present.

Q.22 Give the role of following: (a) Medulla oblongata (b) Cerebellum.

Answer: (a) Medulla oblongata- It controls involuntary action like blood pressure, salivation, vomiting etc.

(b) Cerebellum- This is a part of hindbrain which is responsible for the voluntary actions that we do very precisely. For example- when we walk in a straight line.

This part also controls posture and balance of the body.

Q.23. What are phytohormones? Give examples of these hormones and at least one function.

Answer: Hormones secreted by plants are known as phytohormones.

For example-

- **Auxin-** This is the growth hormone secreted by the tip of the shoot of the plant and promotes the growth of the plant.
- **Abscisic acid-** This hormone restricts the growth of the plant. It is responsible for the wilting of leaves.
- **Gibberellins-** It promotes the growth of the stem of the plant.
- **Cytokinin-** This hormone promotes the cell division process. It is present in those areas where cell division takes place at a higher rate.

Q.24. What is meant by the following: (a) Feedback mechanism (b) Geotropism (c) Thigmotropism?

Answer: (a) Feedback mechanism- This mechanism is for the regulation of the hormone secretion as we require hormones to be secreted in précised quantities. So, what happens is whenever we require the hormone to be secreted in our body there is an activator which activates the particular gland and hormone is secreted. Whenever we don't require there is an inhibitor which inhibits the release of hormone according to requirement of body. This process is called feedback mechanism.

For example- When blood sugar levels start rising pancreas cells start secreting insulin and as the levels are normal they do not secrete insulin.

(b) Geotropism- This refers to the directional movement that takes place in plants due to gravitational pull. As we know that stems of a plant always move toward upwards i.e. away from earth and opposite to gravitational pull and roots moves downwards inside the earth according to the gravitational pull. This upward movement of stem and downward movement of root is due to geotropism.

(c) Thigmotropism- This refers to the directional movement that takes place due to touch as some plants are mechanosensitive. For example- Tendrils are very much sensitive to touch. As they come in contact with any kind of support in that particular part growth rate is retarded while in parts away from it there is higher growth due to rapid cell division in that part.

Due to this reason, only the tendrils get circled around the object. So, this directional movement that the plant exhibit due to touch is termed as thigmotropism.

Q.25. How nervous control differs from hormonal control?

Answer:

Nervous control	Hormonal control
Electrochemical coordination takes place in the nervous system with the help of neurons present all over the body which transmits electrical impulses and neurotransmitters which are the chemicals released by neurons through which the transmission of electric impulses takes place.	Hormonal system is a kind of chemical coordination in which coordination takes place with the help of certain chemical messengers called hormones released by different endocrine glands.
The basic unit that helps in transmission of impulses is neuron.	The basic unit that helps in regulation over here is hormone.
No electric impulse is secreted into blood over here.	Hormones are directly secreted into blood.
For example- Contraction of the skeletal muscles is controlled by motor neurons which transmits electric impulses with the help of the neurotransmitters.	For example- Pancreas secretes insulin to regulate the blood sugar level.

Q. 26 A. (a) Give only the significance of following: (i) Reflex arc

(ii) Reflex action

(iii) Stress hormone.

Answer: (i) The significance of the reflex arcs is their efficiency that they exhibit during quick responses. Reflex arc work as a very efficient method whenever we lack the true thinking processes.

(ii) The significance of reflex action is the protection that we get due to reflex action against any stimulus. Reflex actions are quick responses that we give against any stimulus which can cause harm to us. If we don't have such quick responses we may get armed badly.

For example- If someone touches a flame and does not exhibit any quick response due to reflex action then that particular person will definitely get burnt as thinking processes and then giving a response are not so fast processes and provide enough time for harm.

(iii) Adrenaline hormone is the stress hormone. Due to the release of this hormone our heart starts beating faster due to which more blood is supplied to the muscles, Supply of blood is diverted from digestive system, skin to the muscles, breathing rate is also increased. Due to all this our body gets prepared to deal with that stressful situation and help us to decide whether we are going to fight the situation with the complete energy or will flight from there utilizing the energy produced due to release of stress hormone.

Basically, we can say that this hormone helps us to deal to difficult stressed situations.

Q. 26 B. How are the following organs or structures protected in our body: (i) Spinal cord (ii) Brain?

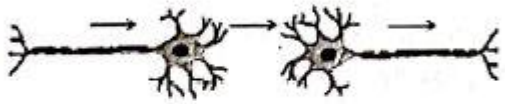
Answer: (i) Spinal cord is protected with the help of the vertebral column.

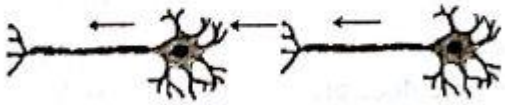
(ii) Brain is protected due to presence of a bony cavity which we call as skull in which brain is placed. This bony cavity is filled with a fluid which absorbs the shock and thus prevents the damage that may be caused to brain.

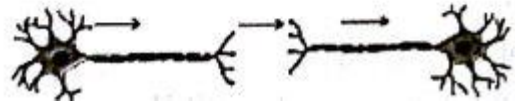
Comprehensive Exercises (MCQ)

Q. 1. What is the correct direction of flow of electrical impulses?

A. 

B. 

C. 

D. 

Answer: Firstly the stimulus is received with the help of dendrites, after that they are transmitted to cyton, and then they travel through the axon and at the end reaches to the terminal branches from where they are transmitted to dendrites of cyton of another neuron as depicted in the option (c).

Q. 2. Which statement is not true about thyroxine?

A. Iron is essential for the synthesis of thyroxine.

B. It regulates carbohydrate, protein and fat metabolism in the body.

C. Thyroid gland requires iodine to synthesise thyroxine

D. Thyroxine is also called thyroid hormone.

Answer: Iodine is essential for the synthesis of thyroxine. Therefore statement (a) is not true about thyroxine.

Q.3. Dwarfism results due to:

A. Excess secretion of thyroxine

B. Less secretion of growth hormone

c. Less secretion of adrenaline

D. Excess secretion of growth hormone.

Answer: Growth hormone is responsible for the growth of the organism. Whenever the hormone is secreted in fewer amounts it leads to retarded growth and ultimately to dwarfism.

Q. 4. 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.

Answer: Changes in puberty are associated with the secretion of oestrogen and testosterone. Oestrogen is secreted from ovary in females and testosterone is secreted in males from testes.

Therefore, correct statement is (c).

Q. 5. Iodine is necessary for the synthesis of which hormone?

A. Adrenaline

B. Thyroxine

C. Auxin

D. Insulin

Answer: Iodine is required for the synthesis of thyroxine hormone. All other hormones are not required iodine for their synthesis.

Q.6. Choose the incorrect statement about insulin:

A. It is produced form pancreas.

B. It regulates growth and development of the body.

C. It regulates blood sugar level.

D. Insufficient secretion of insulin will cause diabetes.

Answer: Insulin is the hormone which is secreted by pancreas and regulates the sugar level of blood and its deficiency lead to diabetes. It has nothing to do with the growth and development.

Therefore, (b) is incorrect statement about insulin.

Q.7. Select the mismatched pair:

A. Adrenaline : Pituitary gland

B. Testosterone : Testes

C. Estrogen : Ovary

D. Thyroxine : Thyroid gland

Answer: Adrenaline hormone is secreted from adrenal gland. Therefore (a) is mismatched pair.

Q. 8. 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

Answer: Shape of guard cells changes due to change in the amount of water in cells. Whenever there is excess of water cell becomes turgid and guard cells get opened for transpiration to take place. Also, when water is not in excess amount guard cells remains closed.

Therefore, shape of guard cells is determined by amount of water in cells.

Q.9. 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.

Answer: Whenever any part of the pea tendril comes in contact with the support they start growing slowly whereas part away from it grows rapidly.

Therefore option (c) is correct.

Q.10. The growth of pollen tubes towards ovules is due to:

A. Hydrotropism

B. Chemotropism

C. Geotropism

D. Phototropism

Answer: Growth of pollen tubes is a directional movement which takes place due to the chemical secretion of the ovule. Therefore, growth of pollen tubes towards ovules is due to chemotropism.

Q.11. 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.

Answer: Given statement is false because at the axonal end electrical impulses bring about the release of some chemicals which generate an electrical impulse at the dendritic end of another neuron.

Q.12. Involuntary action in the body are controlled by:

A. Medulla in forebrain

B. Medulla in midbrain

C. Medulla in hindbrain

D. Medulla in spinal cord

Answer: Medulla is present in the hindbrain and controls the involuntary action. Therefore, correct option is (c).

Q. 13. Which of the following is not an involuntary action?

A. Vomiting

B. Salivation

C. Heartbeat

D. Chewing

Answer: Chewing is an action which person performs according to his/her will and involves skeletal muscles. Therefore, chewing is an involuntary action.

Q. 14. 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.

Answer: When a person will suffer from severe cold he or she will not be able to detect the smell of agarbatti or a perfume because during severe cold the olfactory receptors of the person get affected due to which he/she can’t recognise any kind of smell. All

other receptors for taste, touch and vision can't get affected in severe cold. So, they can easily detect anything related to taste, sight and touch.

Therefore, correct option is (b).

Q. 15. 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 form 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)

Answer: Statements (ii) and (iii) are wrong in their sense because sensory neurons carry signals from receptors to spinal cord and motor neurons carry signals from spinal cord to the muscles. Statement (i) and (iv) are true and therefore correct option is (c).

Q. 16. Which of the following statements are true about the brain?

(i) The main thinking part of brain is hindbrain

(ii) Centres of hearing, smell, memory, sight, etc., are located in forebrain.

(iii) Involuntary actions like salivation, vomiting, blood pressure are controlled by the medulla in the hindbrain.

(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)

Answer: All other statements except (ii) and (iii) are incorrect because forebrain is responsible for thinking process and cerebellum controls posture and balance of the body. Statement (ii) and (iii) are true in their sense. Therefore, correct option is (c) (ii) and (iii).

Q.17. Posture and balance of the body is controlled by:

A. Cerebrum

B. Cerebellum

C. Medulla

D. Pons

Answer: Cerebellum part of hindbrain is responsible for posture and balance. All other options have nothing to do with the posture and balance. Therefore, correct option is (b) Cerebellum.

Q.18. Spinal cord originates from:

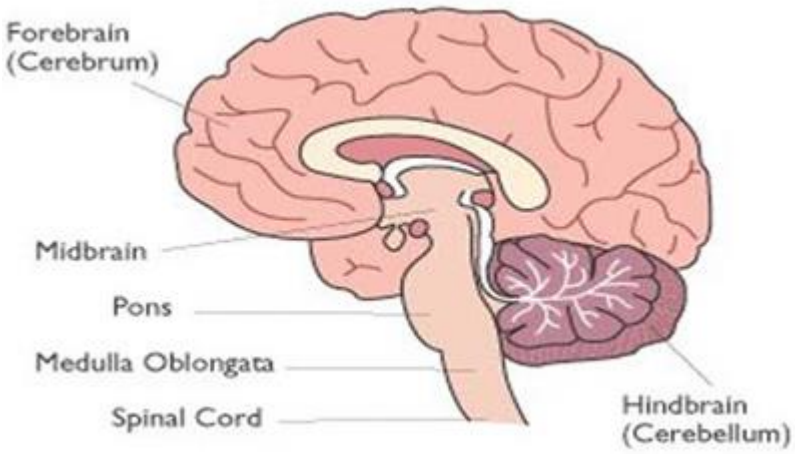
A. Cerebrum

B. Medulla

C. Pons

D. Cerebellum

Answer: Medulla is the part of spinal cord which forms a connection between brain and spinal cord. From medulla spinal cord starts arising. Other part like cerebrum is for thinking activity and is no way related to arising of spinal cord. Cerebellum controls body posture and is also not related to spinal cord. Pons is above the medulla. Only medulla is attached with the spinal cord and this is depicted from the following diagram:



Therefore, correct option is (b) Medulla.

Q.20. 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

Answer: Firstly the stimulus is received with the help of dendrites, after that they are transmitted to cyton, and then they travel through the axon and at the end reaches to the terminal branches from where they are transmitted to another neuron.

Q. 21. In a synapse, chemical signal is transmitted from:

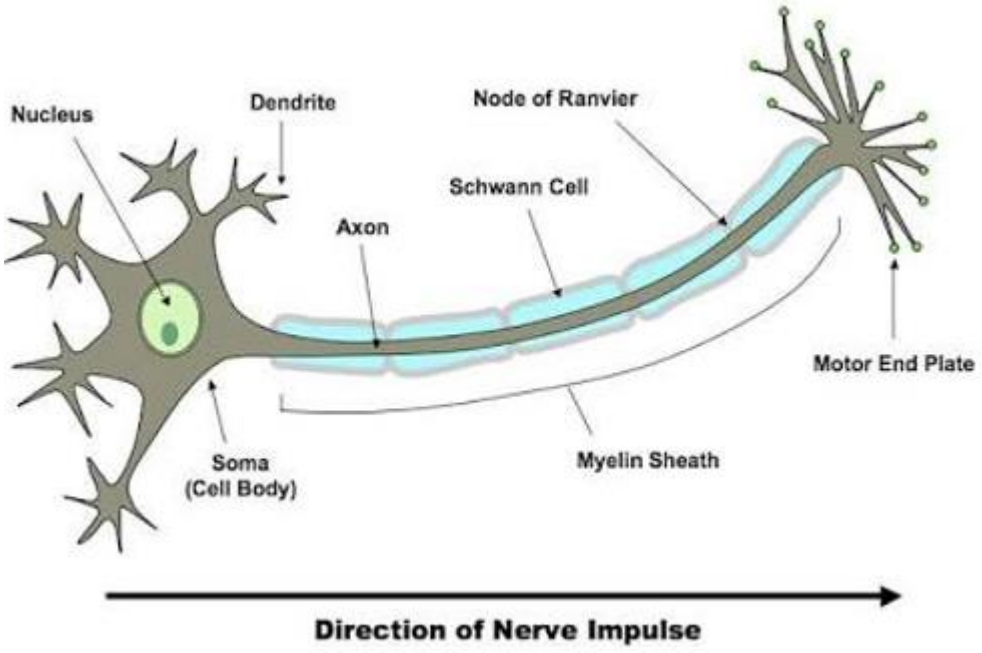
A. Dendritic end of one neuron to axonal end of another neuron

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

Answer: Firstly the stimulus is received with the help of dendrites, after that they are transmitted to cyton, and then they travel through the axon and at the end reaches to the terminal branches from where they are transmitted to dendrites of another neuron.



Therefore, option (d) is correct.

Q. 22. 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

Answer: The conversion of electric signal to chemical signal takes place at axonal end because it transmits the impulse to the other neuron using chemical messengers like acetylcholine. For transmission to other neuron, chemicals are being secreted by axonal ends which by crossing the synapse enter dendrites of another neuron as electric impulse.

Therefore, correct option is (b).

Q.23. Which is the correct sequence of the components of a reflex arc?

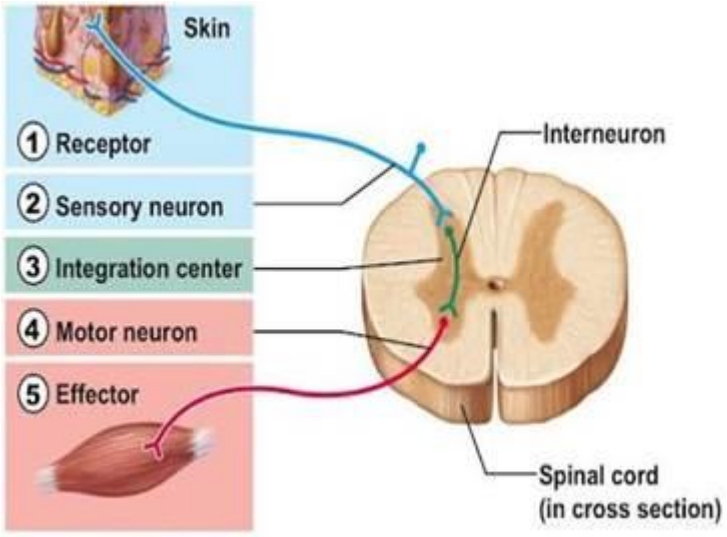
A. Receptors → Muscles → Sensory neuron → Motor neuron → Spinal cord

B. Receptors → Motor neuron → Spinal cord → Sensory neuron → Muscles

C. Receptors → Spinal cord → Sensory neuron → Motor neuron → Muscles

D. Receptors → Sensory neuron → Spinal cord → Motor neuron → Muscles

Answer: First of receptors of the part where stimulus acts receive the stimulus and with the help of sensory neuron transmits signals to the spinal cord. Through spinal cord, this information is received by the brain which directs motor neuron for the further movement. Following picture also depicts the same phenomenon:



Therefore, correct option is (d).

Q.24. Which of the following endocrine glands is unpaired?

A. Adrenal

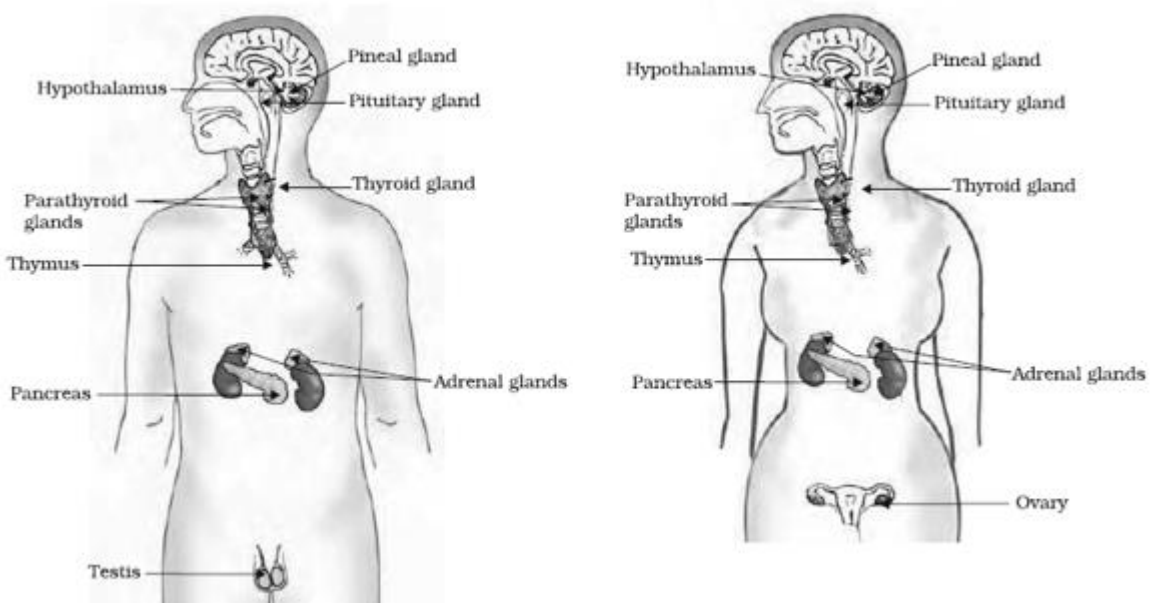
B. Testes

C. Pituitary

D. Ovary

Answer: All other glands remain present in paired form. Only pituitary gland is present in single form.

Following picture depicts the paired nature of Adrenal, Testes, ovary and unpaired nature of pituitary gland:



Therefore, correct option is (c).

Q. 25. Junction between two neurons is called:

A. Cell junction

B. Neuromuscular junction

C. Neural joint

D. Synapse

Answer: Junction between two neurons from where impulse is transmitted from one neuron to the other neuron is called synapse. All other options are wrong in context to junction between two neurons.

Therefore, correct option is (d).

Comprehensive Exercises (T/F)

Q.1. Write true or false for the following statements:

Many of the involuntary actions are controlled by the midbrain and hindbrain.

Answer: Given statement is true.

Explanation- Midbrain and hindbrain control involuntary actions. Actions like blood pressure, vomiting, salivation, sleep etc are controlled by the medulla part of hind brain. Reflexes associated with the vision and hearing is controlled by midbrain.

All the voluntary actions are controlled by Forebrain.

Therefore, given statement is true.

Q.2. Write true or false for the following statements:

Cerebellum is a part of hindbrain.

Answer: Given statement is true.

Explanation- Hindbrain consists of three parts- Pons, Medulla and Cerebellum

Q.3. Write true or false for the following statements:

Blood pressure, salivation and vomiting are controlled by the cerebrum.

Answer: Given statement is false.

Explanation- Blood pressure, salivation and vomiting are controlled by the medulla oblongata. Therefore, given statement is false.

Q.4. Write true or false for the following statements:

Forebrain maintains posture and balance of the body.

Answer: Given statement is false.

Explanation- Cerebellum maintains posture and balance of the body. Therefore, the given statement is false.

Q.5. Write true or false for the following statements:

Insulin raises the sugar level in the blood.

Answer: Given statement is false.

Explanation- Insulin helps in the regulation of the blood sugar level. Therefore, the given statement is false.

Q.6. Write true or false for the following statements:

Deficiency of calcium in our diet causes goitre.

Answer: Given statement is false.

Explanation- Deficiency of iodine in our diet causes goiter. Therefore, the given statement is false.

Q.7. Write true or false for the following statements:

Symptoms of goitre lead to swelling in abdomen.

Answer: Given statement is false.

Explanation- Symptoms of goiter lead to swelling in neck. Therefore, given statement is false.

Q.8. Write true or false for the following statements:

Pituitary secretes growth hormone.

Answer: Given statement is true.

Explanation- Pituitary gland located in the brain secretes the growth hormone. No other gland secretes growth hormone. Therefore, given statement is true.

Q.9. Write true or false for the following statements:

Abscisic acid inhibits growth.

Answer: Given statement is true.

Explanation- Abscisic acid with their secretion prevents the further growth of plant and thus inhibits it. Therefore, given statements is true.

Q. 10. Write true or false for the following statements:

Growth of pollen tubes towards ovules is due to chemotropism.

Answer: Given statement is true.

Explanation: Since here directional movement take place in pollen tubes due to presence of ovules. This is an example of chemotropism and is true.