

# **Chapter-6**

## **Control and Coordination**

### **2 MARKS QUESTIONS**

**1. What happens at the synapse between two neurons?**

**Solution:**

At the synapse between two neurons, electric signals are converted into chemicals that can easily cross over the gap and pass on the chemical messenger to the next neuron where it is converted back to electrical signal.

**2. Which part of the brain maintains the posture and equilibrium of the body?**

**Solution:**

Cerebellum, which is a part of the brain, is responsible for controlling the motor functioning. Hence, it is the part engaged in the maintenance of posture and equilibrium of the body.

### **3. How do we detect the smell of an agarbatti (incense stick)?**

#### **Solution:**

The smell of an agarbatti is detected by the nose. The olfactory receptors present in the nose send an electrical signal to the fore brain. The fore brain interprets this signal as the smell of the incense stick.

### **4. How does chemical coordination take place in animals?**

#### **Solution:**

Chemical coordination takes place in animals with the help of chemical messengers called hormones. Hormones are the chemicals that are secreted by specific endocrine glands. Hormones regulate the growth, development and homeostasis of the animals.

### **5. Why is the use of iodized salt advisable?**

#### **Solution:**

Usage of iodized salt is advisable to avoid the deficiency of iodine. If the intake of iodine is low, the release of thyroxine from the thyroid gland will be decreased. This affects fat, carbohydrate and protein metabolism. Thus, a person may have goitre if the intake of iodine is lowered.

### **6. Which of the following is a plant hormone?**

**(a) Insulin**

**(b) Thyroxin**

**(c) Oestrogen**

**(d) Cytokinin**

**Solution:**

Answer is d) cytokinin.

Cytokinin is a plant hormone whereas Insulin, Thyroxin, Oestrogen are the hormones produced by animals.

**7. The brain is responsible for**

**(a) Thinking.**

**(b) Regulating the heartbeat.**

**(c) Balancing the body.**

**(d) all of the above.**

**Solution:**

Answer is (d) all the above

Brain is responsible for thinking, brain regulates the heartbeat, and it balance the body.

**8. Which part of the brain maintains posture and equilibrium of the body?**

**Solution :**

Cerebellum, a part of hindbrain is responsible for maintaining posture and equilibrium of the body.

## **4 MARKS QUESTIONS**

### **1. What are plant hormones?**

#### **Solution:**

Plant hormones are the organic substances produced at certain sites of a plant and are translocated to other parts based on the requirement. Plant hormones help to coordinate growth, development and responses to the environment. Ex: Auxin's Gibberlin's, cytokines, abscisic acid and ethylene.

### **2. Give an example of a plant hormone that promotes growth.**

#### **Solution:**

Auxins and Gibberlins are the hormone responsible for the growth of plant.

Auxins are responsible for the cell elongation in shoot and also regulate growth.

Gibberlin is responsible for stem elongation and germination.

### **3. How do auxins promote the growth of a tendril around a support?**

#### **Solution:**

Auxins are the plant hormones produced at the tips of shoots and roots. Auxins are present at the tip of tendrils. When tendrils are attached around any support, their growth is slowed down as auxins are sensitive to touch. This makes them move to the other side of the tip to get support; this makes the other side grow faster than the side of tendril in contact with the support and the tendril bends towards the support.

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#### **6. How does our body respond when adrenaline is secreted into the blood?**

##### **Solution:**

Adrenaline is a hormone secreted when a person is frightened or mentally disturbed. When Adrenaline reaches the heart, heartbeat will increase to increase blood supply to our muscles. Adrenaline also increases the breathing rate because of contraction of diaphragm and the rib muscles. Adrenaline rush also increases blood pressure and allows entry of more glucose into blood. All these occur when our body responds to the secretion of adrenaline into our blood.

**7. Why are some patients of diabetes treated by giving injections of insulin?**

**Solution:**

Diabetes is a condition where the pancreatic cells of a person stops producing or reduces the production of insulin hormone. Insulin regulates blood glucose by converting extra glucose to glycogen. When insulin is not produced adequately, a person's blood glucose level is affected and this leads to adverse effects. In order to maintain the insulin and blood glucose levels, diabetes patients are treated with injections of insulin.

**8. The gap between two neurons is called a**

**(a) Dendrite.**

**(b) Synapse.**

**(c) Axon.**

**(d) Impulse.**

**Solution:**

Answer is (b) Synapse

Dendrite is a short branched extension of a nerve cell, along which impulses received from other cells at synapses are transmitted to the cell body.

An axon or nerve fiber is a long, slender projection of a nerve cell or neuron in vertebrates that typically conducts electrical impulses known as action potentials away from the nerve cell body. The function of the axon is to transmit information to different neurons, muscles, and glands.

Impulse is an electrical signal that travels along axon.

**9.What is the function of receptors in our body? Think of situations where receptors do not work properly. What problems are likely to arise?**

**Solution:**

Receptors are present throughout our body – mainly in sense organs. Receptors collect the information about changes that happen around us and send the signal/information to the brain which responds to the change detected. When receptors do not work properly, the environmental stimuli are not able to create nerve impulses and body does not respond.

**10. How does phototropism occur in plants?**

**Solution:**

Directional movement and growth of plant in response to light is called as phototropism. Phototropism occurs due to increased auxin on the dark side and decreased auxin on the illuminated side. Because of presence of more auxin, a leaf in the darker side grows faster causing it to bend towards the source of light.

**11. Which signals will get disrupted in case of a spinal cord injury?**

**Solution:**

In case of a spinal cord injury, signals coming from the nerves, as well as the signals coming to the receptors, will be disrupted. Both these signals meet in a bundle in the spinal cord. Hence, both these signals get disrupted.

## **12. How does chemical coordination occur in plants?**

### **Solution:**

Plant growth, development and responses to the environment is controlled and coordinated by a special class of chemical substances known as hormones. Hormones are produced in one part of the plant and are transported to all the needy parts of the plant. The five major types of phytohormones are auxins, gibberellins, cytokinins, abscisic acid, and ethylene. These phytohormones are either growth promoters (such as auxins, gibberellins, cytokinins, and ethylene) or growth inhibitors such as abscisic acid.



## **7 MARKS QUESTIONS**

### **1. How does chemical coordination occur in plants?**

#### **Solution:**

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### **2. What is the need for a system of control and coordination in an organism?**

#### **Solution:**

There are various organs in an organism. These organs must be carefully controlled and coordinated for the survival of an organism. In the body of an organism, various fluids are secreted from the glands of the endocrine system. These hormones are responsible for the overall growth and development of an organism. All other daily decisions that include voluntary and involuntary actions are controlled by the central nervous system (CNS).

Coordination is needed for all human activities we perform. Our nervous system receives information from surroundings which is processed and a response is elicited. The endocrine system (hormonal system) helps in integrating various metabolic activities like reproduction, development, and all reflex actions (cope up with various give up situations).

The hormonal system in plants helps in process of photosynthesis; they need carbon dioxide, water and sunlight. The stomatal opening in leaves opens up to allow in carbon dioxide gas, the roots bend towards water, the stem grows towards sunlight, and the tendrils in climbing plants are supported by the hormonal system of the plant body.

Thus, we need a control and coordination system in an organism.

### 3. How are involuntary actions and reflex actions different from each other?

**Solution:**

Reflex actions	Involuntary actions
1. Rapid automatic responses to a stimulus without the conscious involvement of the brain	1. Occurs without the consciousness of an organism
2. Controlled by spinal cord	2. Controlled by mid brain or medulla oblongata
3. Very quick and instantaneous	3. Relatively slower
4. May involve any muscle or a gland	4. Involves only smooth muscles
5. Can be conditioned	5. Cannot be influenced by external conditioning
Examples: Blinking of eyes, salivation	Examples: Beating of heart, blood circulation

#### 4. Compare and contrast nervous and hormonal mechanisms for control and coordination in animals.

**Solution:**

Nervous control	Hormonal Control
1 It consists of nerve impulses between PNS, CNS and Brain.	1 It consists of the endocrine system which secretes hormones directly into blood.
2 Here response time is very short.	2 Here response time is very long.
3 Nerve impulses are not specific in their action.	3 Each hormone has specific actions.
4 The flow of information is rapid.	4 The flow of information is very slow.

#### 5. What is the difference between the manner in which movement takes place in a sensitive plant and the movement in our legs?

**Solution:**

Sl. no	Movement in sensitive plants	Movement in our legs
1	The movement in a sensitive plant is a response to stimulus (touch) which is an involuntary action.	1 Movement in our legs is a voluntary action.
2	No special tissue is there for the transfer of information	2 A complete system CNS and PNS is there for the information exchange.

3 Plant cells do not have specialized protein for movements.

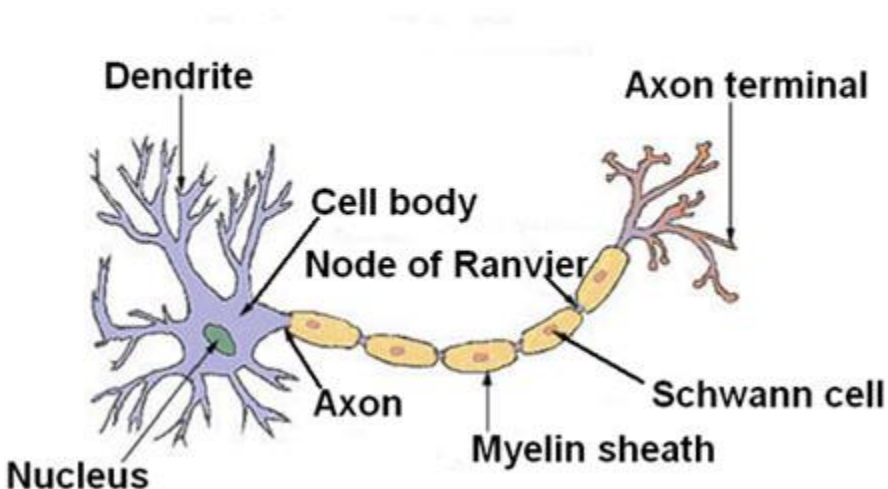
3 Animal cells have specialized protein which help muscles to contract.

## 6. Draw the structure of a neuron and explain its function.

### Solution:

Neurons are nerve cells which are functional units of the nervous system. Three main parts of neurons are Dendrites, Axons and cell body.

### Structure of a Typical Neuron



Dendrite: Detects information and sends it to cell body

Cell Body: Maintains growth of the cell

Axon: Conducts messages away from cell body and signal to next neuron.

## 7. Design an experiment to demonstrate hydrotropism.

### Solution:

To demonstrate hydrotropism in plants.

Procedure :

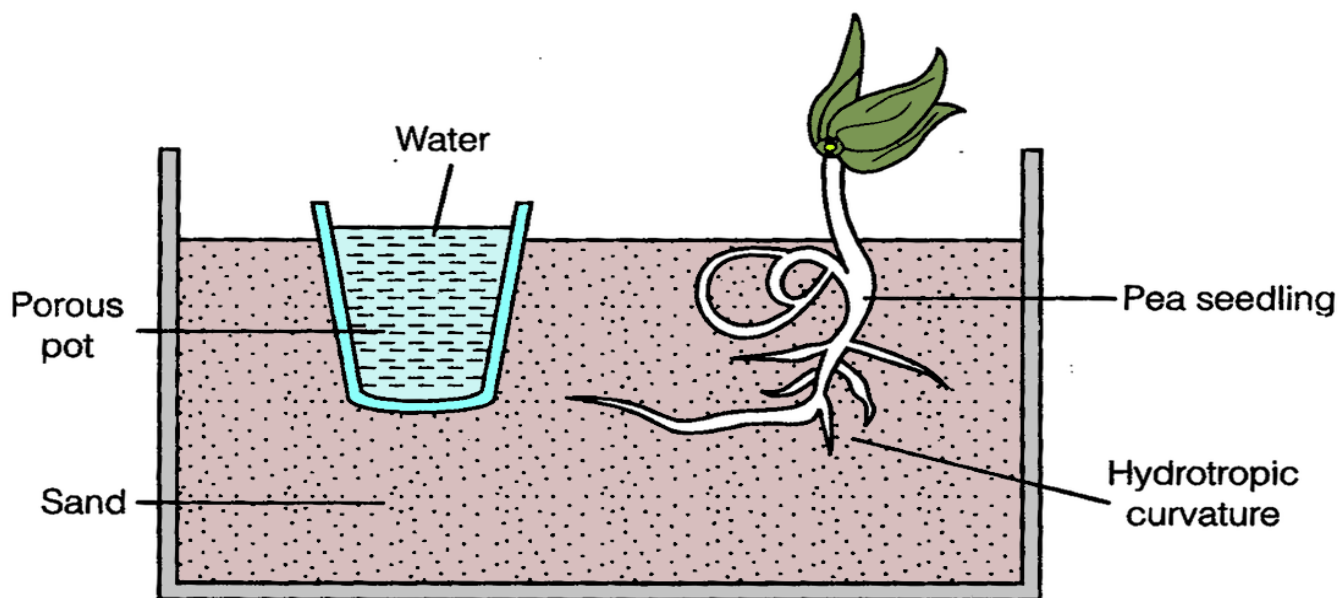
- i. Plant a seedling in a vessel containing soil.
- ii. Adjacent to the seedling put a porous pot containing water.
- iii. Leave the set up for few days.

Observation :

- iv. On examining the roots, it is observed that the roots bend towards the source of water and do not grow straight.

Result :

It confirms that plants show hydrotropism as the roots bend towards the porous pot of water. As hydrotropism is a plant-growth response in which the direction of growth is determined by a stimulus of gradient in water concentration.



### 8. How is the movement of leaves of a sensitive plant different from the movement of a shoot towards light?

**Solution:**

Sl. no	Movement of leaves of a sensitive plant	Movement of a shoot towards light
1	It does not depend on the direction of stimulus applied.	Depends on the direction of stimulus applied.
2	Nastic movement	Tropic movement
3	Touch is the stimulus	Light is the stimulus
4	Caused by the sudden loss of water from the swellings at the base of leaves	Caused by the unequal growth on the two sides of the shoot.
5	Not a growth movement	Growth movement
6	Occurs very fast	Occurs slowly

### 9. What is the role of the brain in reflex action?

**Solution:**

Reflex actions are formed instantaneously in response to a stimulus that has no time to think. For instance, the sensory nerves that detect heat are connected to the nerves that move the muscles of the hand. Such a connection of detecting the signal from the nerves (input) and responding to it quickly (output) is known as reflex arc.

Reflex action are generated in spinal cord and the information also reaches brain. This helps the brain to record this event and remember it for future use. Brain helps the person to get awareness of the stimulus and prevent the danger posed by the situation in the future.

## **MULTIPLE CHOICE QUESTIONS**

**1) What is the function of the pituitary gland?**

- (a) To develop sex organs in males
- (b) To stimulate growth in all organs
- (c) To regulate sugar and salt levels in the body
- (d) To initiate metabolism in the body

**Correct Answer: Option (b)**

**2) Which of the following option shows the order of events correctly when a bright light is focused on our eyes?**

- (a) Bright light → receptors in eyes → sensory neuron → spinal cord → motor neurons → eyelid closes
- (b) Bright light → receptors in eyes → spinal cord → sensory neuron → motor neurons → eyelid closes
- (c) Bright light → receptors in eyes → sensory neuron → motor neurons → spinal cord → eyelid closes
- (d) Bright light → receptors in eyes → spinal cord → motor neurons → sensory neuron → eyelid closes

**Correct Answer: Option (a)**



**3) A female is suffering from an irregular menstrual cycle. The doctor prescribed her some hormonal tablets. Which option shows that the hormone she lacks in her body is from the endocrine gland?**

- (a) Oestrogen
- (b) Testosterone
- (c) Adrenalin
- (d) Thyroxin

**Correct Answer: Option (a)**

**4) When we touch the leaves of the “touch-me-not” plant, they begin to fold up and droop. How does the plant communicate the information of touch?**

- (a) The plant uses electrical signals to transfer information from the external environment to cells.
- (b) The plant uses electrical-chemical signals to transfer information from cell to cell.
- (c) The plant uses electrical-chemical signals to transfer information from tissue to specialised cells.
- (d) The plant uses electrical signals to transfer information from cells to specialised tissues.

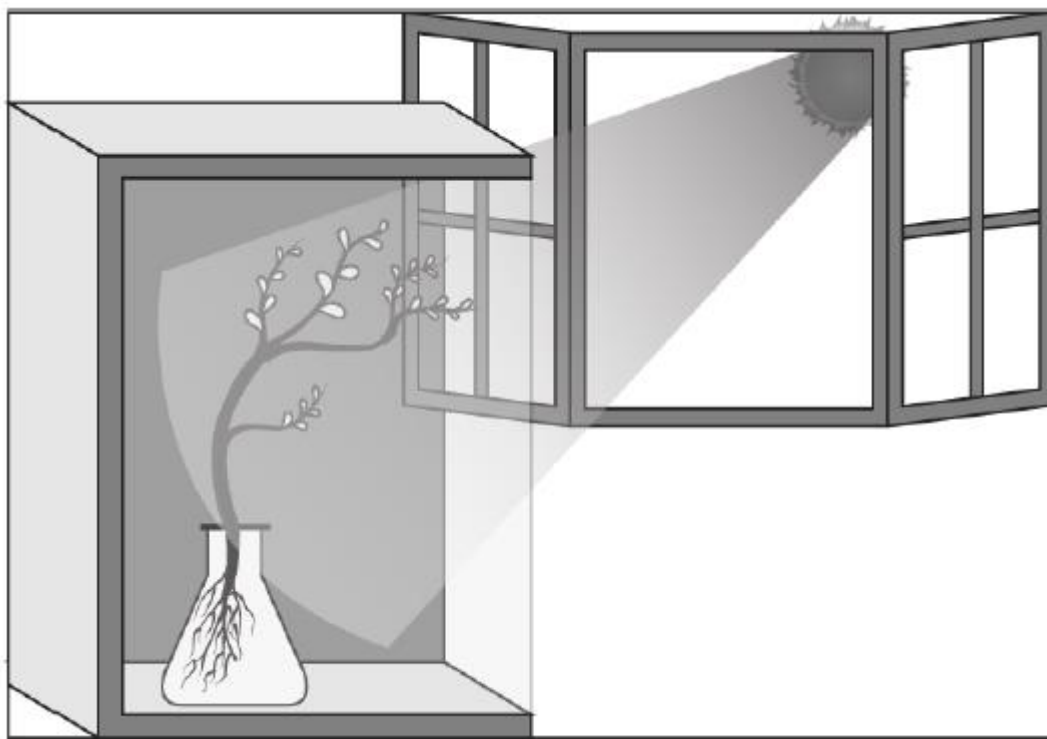
**Correct Answer: Option (b)**

**5) How will information travel within a neuron?**

- (a) Dendrite → cell body → axon → nerve ending
- (b) Dendrite → axon → cell body → nerve ending
- (c) Axon → dendrite → cell body → nerve ending
- (d) Axon → cell body → dendrite → nerve ending

**Correct Answer: Option (a)**

**6) Raghav potted some germinated seeds in a pot. He put the pot in a cardboard box that was opened from one side. He keeps the box in a way that the open side of the box faces sunlight near his window. After 2-3 days, he observes the shoot bends towards the light, as shown in the image.**



**Which type of tropism does he observe?**

- (a) Geotropism
- (b) Phototropism
- (c) Chemotropism
- (d) Hydrotropism

**Correct Answer: Option (b)**

**7) Which parts of the brain control blood pressure?**

- (a) Spinal cord, skull, hypothalamus
- (b) Cord, skull, cerebrum
- (c) Pons, medulla, cerebellum
- (d) Pons, medulla, pituitary

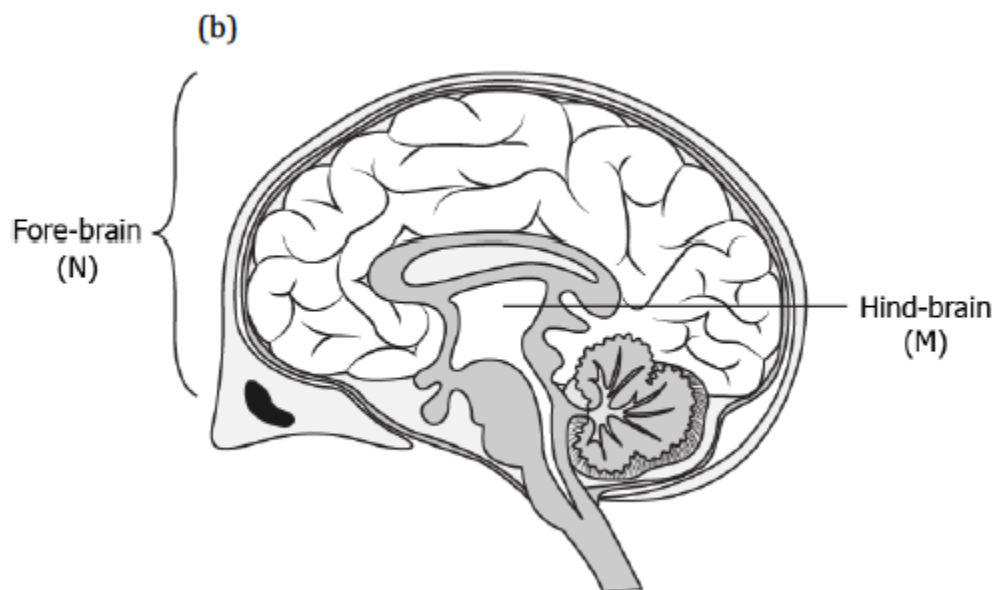
**Correct Answer: Option (c)**

**8) Organisms depend on hormones as well as electric impulses for the transmission of signals from the brain to the rest of the body. What can be a likely advantage of hormones over electric impulses?**

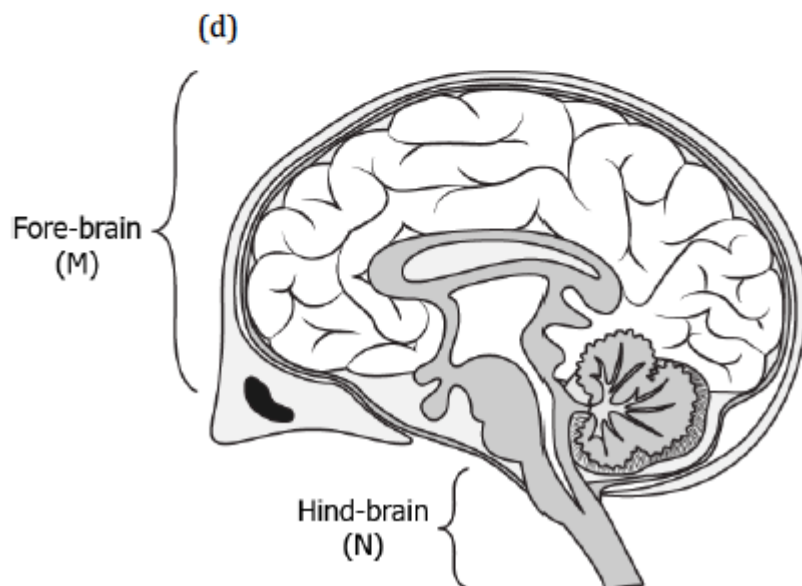
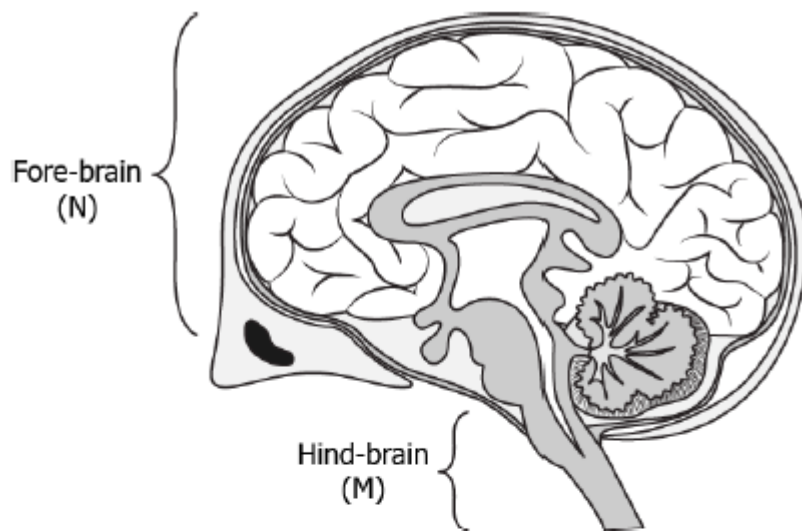
- (a) It is secreted by all types of cells present in the body.
- (b) It is secreted by stimulated cells and reaches all cells of the body.
- (c) It is relayed to the target organ faster than electric impulses.
- (d) It does not depend on an external stimulus to be generated in the cells.

**Correct Answer: Option (b)**

**9) Which of the following option illustrates the location of the centre that controls the feelings associated with hunger (M) and the centre that allows a person to walk in a straight line (N)?**

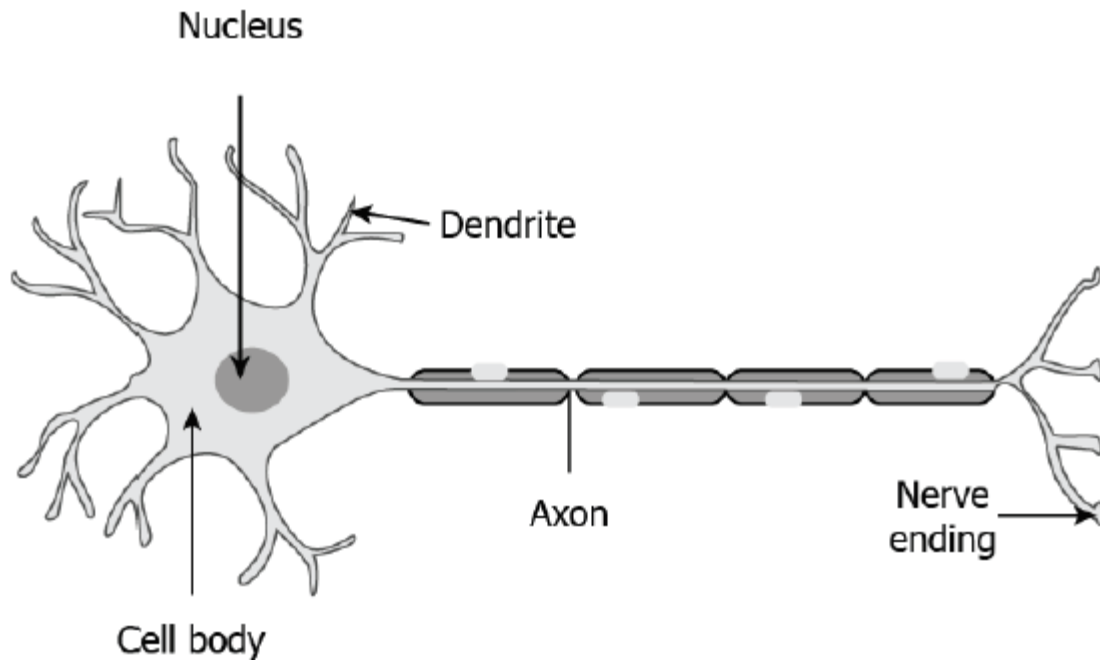


(c)



**Correct Answer: Option (d)**

**10) The image shows the structure of a neuron.**



**Which of the following options shows the mechanism of the travelling of sense in our body after our nose senses a smell?**

- (a) Olfactory receptors → dendritic tip of a nerve cell → axon → nerve ending → release of the signal dendritic tip of another nerve cell
- (b) Olfactory receptors → dendritic tip of a nerve cell → axon → cell body → release of signal → dendritic tip of other nerve cell
- (c) Gustatory receptors → dendritic tip of a nerve cell → cell body → axon → release of the signal dendritic tip of another nerve cell
- (d) Gustatory receptors → dendritic tip of a nerve cell → axon → cell body → release of the signal dendritic tip of another nerve cell

**Correct Answer: Option (a)**

## **FILL IN THE BLANKS**

1.The central nervous system consists of the brain and \_\_\_\_\_.

**(Answer: spinal cord)**

2.Neurons transmit signals in the form of electrical impulses through long, slender projections called \_\_\_\_\_.

**(Answer: axons)**

3.The gap between two neurons where neurotransmitters are released is called the \_\_\_\_\_.

**(Answer: synapse)**

4.The hormone \_\_\_\_\_ is produced by the pancreas and regulates blood sugar levels.

**(Answer: insulin)**

5.The part of the brain responsible for coordinating voluntary muscle movements is the \_\_\_\_\_.

**(Answer: cerebellum)**

6.The involuntary response to a stimulus without conscious thought is known as a \_\_\_\_\_.

**(Answer: reflex)**

7.The \_\_\_\_\_ system includes glands that secrete hormones directly into the bloodstream.

**(Answer: endocrine)**

8.The master gland that controls the activities of other endocrine glands is the \_\_\_\_\_.

**(Answer: pituitary)**

9.The \_\_\_\_\_ nervous system prepares the body for the "fight or flight" response.

**(Answer: sympathetic)**

10.Photoreceptors in the eyes, called \_\_\_\_\_, are sensitive to light and contribute to vision.

**(Answer: rods and cones)**