Control and Coordination

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CLASS: X **BIOLOGY**

1. **What provides control and coordination in multicellular organisms?**

   Specialised tissues provide control and coordination activities.

2. **Name the tissues, which provide control and coordination in multicellular organisms.**
   Nervous tissues and muscular tissues.

3. **What is nervous tissue made of? What is it specialized for?**

   Nervous tissue is made up of an **organized network** of **nerve cells** or neurons, and is specialised for **conducting information** via **electrical impulses** from one part of the body to another.

4. **What is reflex action? Give any two examples.**

   The **sudden involuntary action** in **response to** the stimulus is called reflex action.

   - Pulling the hand back from the flame.
   - Watering of mouth.
   - Change in the size of the pupil

5. **What constitute central nervous system?**

   The brain and spinal cord constitute the central nervous system.

6. **Name the system, which facilitates the communication between the central nervous system and the other parts of the body. What does it consist of?**

   Peripheral nervous system consisting of cranial nerves arising from the brain and spinal nerves arising from the spinal cord.

7. **How do we know that we have eaten enough? Name the parts of the brain which control involuntary actions.**

   The sensation of feeling full is because of a **centre associated with hunger** which is in a separate part of the **fore-brain.** Involuntary actions are controlled by the **mid-brain** and **hind-brain.**

8. **What is geotropism?**

   The movement of plant parts towards or against gravity is called geotropism.

   The **upward growth of shoots** and **downward growth of roots** in response to the gravity is geotropism.

9. **Give an example each of chemotropism and thigmotropism**

   The growth of pollen tubes towards ovules – Chemotropism

   The movement of the sensitive plant in response to touch- Thigmotropism

10. **Give an example of heliotropism.**

    The movement of sunflowers in response to day or night.

11. **What are the functions of medulla?**

    Controlling Blood pressure, Salivation and Vomiting

12. What are the functions of cerebellum?

It is responsible for

Precision of voluntary actions and

Maintaining the posture and balance of the body.

(a) While travelling by a bus on a hill road, a boy vomited. Name the part of the brain responsible for this action.

(b) Name the part of the body which helps in the following activities; Walking in a straight line, Riding a bicycle, Picking up a pencil.

(a) Medulla

(b) Cerebellum

13. Where is brain located? What provides shock absorption to the brain?

The brain is located inside a bony box called cranium. Inside the box, the brain is surrounded by a fluid-filled balloon which provides shock absorption.

14. How does a muscle cell move?

The muscle cells move by changing their shape so that they shorten.

15. How do muscle cells change their shape?

- Muscle cells have **special proteins** that change both their **shape and their arrangement** in the cell **in response to nervous electrical impulses.**
- When this happens, **new arrangements of these proteins** give the muscle cells a **shorter form.**

16. How does cell to cell communication occur in plant cells?

The plants also use **electrical-chemical means** to convey this information from cell to cell, but unlike in animals, there is no specialised tissue in plants for the conduction of information.

17. How do plant cells change their shape?

Plant cells change shape by **changing the amount of water** in them, resulting in swelling or shrinking, and therefore in changing shapes.

18. Name a plant that, climb upon other plant by means of tendrils.

Pea plant

19. Why is it important for us to have iodised salt in our diet?

Iodine is necessary for the **thyroid gland** to make **thyroxin** hormone.

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

20. What is the role of iodine in our body? What is caused due to iodine deficiency?

Iodine is essential for the synthesis of **thyroxin**. Iodine deficiency leads to **goiter.** One of the symptoms in this disease is a swollen neck.

21. Name the hormone responsible for wilting of leaves and inhibition of growth.

Abscisic acid.

22. Name a hormone secreted by pituitary. What is its function?

Growth hormone is one of the hormones secreted by the pituitary.

It regulates **growth and development of the body**.

If there is a deficiency of this hormone in childhood, it leads to dwarfism.

23. What causes the changes associated with puberty?

The changes associated with puberty are because of the secretion of testosterone in males and oestrogen in females.

24. (a) Mr. Bean has been advised by the doctor to take less sugar in his diet. Name the disease he is suffering from?

(b) Name the hormone and gland responsible for the disease.

(c) What is the function of the hormone?

(d) What is the treatment for the disease?

(a) Disease: Diabetes

(b) Hormone: Insulin Gland: pancreas

(c) Function: It helps in regulating blood sugar levels.

(d) Treatment: Taking insulin injections.

25. What happens if insulin is not secreted in proper amounts?

The sugar level in the blood rises causing many harmful effects.

26. If it is so important that hormones should be secreted in precise quantities, we need a mechanism through which this is done.

(a) Name the mechanism.

(b) What does it regulate? Give an example.

(a) Feedback mechanism

(b) The **timing and amount** of hormone released are regulated by feedback mechanisms. For example, if the sugar levels in blood rise, they are **detected by the cells of the pancreas** which **respond by producing more insulin**.

As the blood sugar level falls, **insulin secretion is reduced.**

27. How does a tendril circle around the support and help in climbing on the support?

- The tendrils are sensitive to touch.
- When they come in contact with any support, the growth hormone accumulates more on the part of the **tendril which is away from the support.**
- So the part of the **tendril away from the support grows more** than the part of the **tendril in contact with the object**.
- This causes the tendril to **circle around the object** and thus cling to it.
- Plants respond to stimuli slowly by growing in a particular direction.

28. How will you demonstrate phototropism?

- Fill a conical flask with water. Cover the neck of the flask with a wire mesh.

- Keep two or three freshly germinated bean seeds on the wire mesh. Take a cardboard box which is open from one side.
- Keep the flask in the box in such a manner that the open side of the box faces light coming from a window.
- After two or three days, you will notice that the shoots bend towards light and roots away from light.

29. What are the limitations of electrical impulses?

- Electrical impulses are an excellent means of fast transfer of information. But there are limitations to the use of electrical impulses.
- Firstly, they will reach only those cells that are connected by nervous tissue, not each and every cell in the animal body.
- Secondly, once an electrical impulse is generated in a cell and transmitted, the cell will take some time to reset its mechanisms before it can generate and transmit a new impulse.
- In other words, cells cannot continually create and transmit electrical impulses.

30. Touching a hot object is an urgent and dangerous situation for us. We need to detect it, and respond to it.

(a) How do we detect that we are touching a hot object?

(b) Where are the receptors located?

(c) Name the receptors of taste and smell.

(a) All information from our environment is detected by the specialised tips of some nerve cells.

- This information, acquired at the end of the dendritic tip of a nerve cell sets off a chemical reaction that creates an electrical impulse.
- This impulse travels from the dendrite to the cell body, and then along the axon to its end.
- At the end of the axon, the electrical impulse sets off the release of some chemicals.
- These chemicals cross the gap, or synapse, and start a similar electrical impulse in a dendrite of the next neuron.

(b) These receptors are usually located in our sense organs, such as the inner ear, the nose, the tongue, and so on.

(c) Gustatory receptors will detect taste while olfactory receptors will detect smell.

31. What causes the shoot to bend when it is exposed to light?

When growing plants detect light, a hormone called **auxin, synthesised at the shoot tip**, helps the **cells to grow longer.**

When light is coming from **one side of the plant**, **auxin diffuses towards the shady side** of the shoot.

This concentration of auxin **stimulates the cells to grow longer** on the side of the shoot which is away from light. Thus, the shoot of the plant bend towards the light.

32. Write the functions of phytohormones.

- Auxins and Gibberellins help in the growth of the stem.
- Cytokinins promote cell division. They are present in greater concentration in areas of rapid cell division, such as in fruits and seeds.
- Abscisic acid inhibits growth.

33. How does our body respond when adrenaline is secreted into the blood?

- Adrenaline is secreted directly into the blood and carried to different parts of the body.
- The target organs or the specific tissues on which it acts include the heart.
- As a result, the heart beats faster, resulting in supply of more oxygen to our muscles.
- The blood to the digestive system and skin is reduced due to contraction of muscles around small arteries in these organs. This diverts the blood to our skeletal muscles.
- The breathing rate also increases because of the contractions of the diaphragm and the rib muscles.
- All these responses together enable the animal body to be ready to deal with the situation.

34. Describe the parts of the brain and their functions.

Region of brain	Part of the brain	Functions
Fore brain	**Cerebrum**	It is the largest part of brain and the **sheet of intelligence** and responsible for thinking, reasoning and memory. It is also responsible for vision, hearing, smelling, tasting and feeling. It controls the movement of voluntary muscles such as muscles of legs and hands etc.
Mid-brain and hind-brain		**(Involuntary Actions)** change in the size of the pupil, and the thought out actions such as moving a chair
Hind-brain	**Cerebellum**	**It is responsible for** Precision of voluntary actions and Maintaining the posture and balance of the body. **Activities like** Walking in a straight line, Riding a bicycle, Picking up a pencil.
	Medulla	It controls involuntary actions including Respiration Blood pressure Salivation Vomiting
	Pons	Respiration

The Medulla:
The medulla oblongata is the primary respiratory control center. There are two regions in the medulla that control respiration:

- The ventral respiratory group stimulates expiratory movements.
- The dorsal respiratory group stimulates inspiratory movements.

The medulla also controls the reflexes for non-respiratory movements, such as coughing and sneezing reflexes, swallowing and vomiting.

The Pons:
The pons is the other respiratory center and is located underneath the medulla.
Its main function is to control the rate or speed of involuntary respiration.
It has two main functional regions are apneustic and pnuemotaxic centers.
The apneustic and pnuemotaxic centers work against each other to control the respiratory rate.

35. Describe the different types of tropic movement in plants with examples.

Geotropism

The upward growth of shoot and downward growth of root in response to the gravity is called geotropism.

Hydrotropism

The movement of plant parts towards the source of water is called hydrotropism. Eg. Movement of roots in response to water.

Chemotropism

The movement of plant parts towards the source of chemicals is called Chemotropism. Eg. Growth of pollen tubes towards ovules.

Thigmotropism

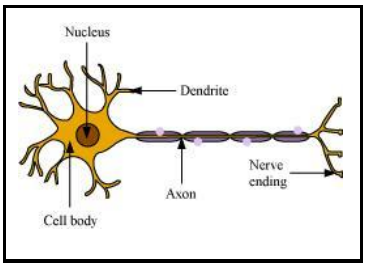
The movement of plant parts towards the stimulus touch is called thigmotropism. Eg. Movement of tendril around the support.

Heliotropism

The movement of sunflower in response to the sun is called heliotropism. It is a slow process.

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

Neurons are the functional units of the nervous system. The three main parts of a neuron are axon, dendrite, and cell body.



Structure of a neuron

Functions of neuron:

Part of Neuron	Function
Dendrite	It receives information from axon of another cell and conducts the messages towards the cell body.
Cell body	It contains nucleus, mitochondria, and other organelles. It is mainly concerned with the maintenance and growth.
Axon	It conducts messages away from the cell body.

37. Sometimes we come across people who are either very short (dwarfs) or extremely tall (giants). Name the hormone and the gland responsible for this. Mention the function of this hormone. What will happen if there is a deficiency of this hormone?

Growth hormone which is secreted by the pituitary gland.

Growth hormone regulates growth and development of the body. Excess growth hormone in childhood leads to gigantism. Deficiency of this hormone leads to dwarfism.

38. Name the gland which produces insulin. Mention the function of insulin. What will happen if insulin is not secreted in proper amounts?

Insulin is produced by the pancreas and helps in regulating blood sugar levels.

If it is not secreted in proper amounts, the sugar level in the blood rises causing many harmful effects.

39. How do the plants detect the touch, and how do the leaves move in response to stimuli?

The plants also use electrical-chemical means to convey the information from cell to cell, but unlike in animals, there is no specialised tissue in plants for the conduction of information.
Plant cells change shape by changing the amount of water in them, resulting in swelling or shrinking, and therefore in changing shapes.

40. What is the difference between a reflex action and walking?

No	Reflex action	Walking
1	It is a sudden unconscious automatic response to a stimulus.	It is a voluntary action.
2	It occurs at the level of spinal cord. Brain is not involved.	Brain is involved in the thinking process.
3	It is a quick action.	It is a slow action.

All the cells, tissues and organs work together as a team to carry out various life processes. Hence there is a basic need to control and coordinate all these processes.
One of the essential factors in control and coordination of all these processes is rapid communication. It occurs in human beings with the help of nervous system and endocrine system.

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