CLASS X
BIOLOGY
CHAPTER 14
CONTROL AND COORDINATION IN LIVING BEINGS

SOLUTIONS

TEXTUAL QUESTIONS & ANSWERS

Let us answer (page no. - 279)

Q.1. What is a reflex action?

Ans: An involuntary sudden, spontaneous response to a stimulus controlled by spinal cord is called a **reflex action**.

Q.2. What happens at the synapse between two neurons?

Ans: The transmission of electrical impulse between two neurons takes place through the synapse. When such an impulse reaches the nerve endings, it sets off the release of chemicals called neurotransmitters at the synapse that cross the gap and bind to the dendrite of the next neuron and start a similar nerve impulse.

Q.3. Why should we use iodised salt?

Ans: Iodine is needed by the thyroid gland for the synthesis of thyroxine hormone. The deficiency of iodine causes goitre characterized by swollen neck in the absence of thyroxine. Therefore iodized salts are recommended in our diet in order to prevent from goitre (due to enlargement of thyroid gland).

Q.4. Why are some patients of diabetes treated by giving injections of insulin?

Ans: The blood sugar level is high in some diabetic patients due to inadequate secretion of insulin by pancreas. Insulin converts excess sugar present in blood into glycogen. Thus, some patients are given insulin to control their normal blood sugar level.

Let us answer (page no. 283)

Q.1. What is the factor responsible for the movement of leaves in the sensitive plants?

Ans: The movement in the leaves of sensitive plant occurs without involving any growth due to changes in turgor pressure or shape of **specialized cells**.

Q.2. What are plant hormones?

Ans: Plant hormones are organic substances which are synthesized in minute quantities in one part of the plant body and transported to another part where they influence specific physiological processes.

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

Ans: When tendrils come in contact with the support, the side away from the support grows faster due to higher concentration of **auxin** than the side which is in contact with the support. Such a slow growth movement is an example of plant response induced by the stimulus of touch (**Thigmotropism**). Thus, the unequal distribution of **auxin** is responsible for growth of tendril encircling around the support.

Q.4 Give an example of Chemotropism.

Ans: The growth of pollen tube through stigma and style towards ovule is an example of chemotropism induced by chemicals present inside ovary.

TEXTUAL EXERCISE

Q.1 How does Phototropism occur in plants?

Ans: The growth of the stem towards unilateral stimulus of light is known as phototropism which occurs due to the action of **auxin** which is synthesized at the shoot tip that diffuses towards the dark side of the stem. The higher concentration of **auxin** stimulates the cells to grow longer on the dark side of the shoot than the light side leading to its bending towards light.

Q.2 Why do roots grow towards the soil? Explain with three points.

Ans: The growth movements in response to gravity are called geotropism.

Roots grow vertically downwards due to gravitational pull.

Primary roots grow down to the soil are positive geotropic and negative phototropic. The concentration of auxin stimulatory for stem growth is inhibitory in case of roots.

Q.3 Explain the function of two growth inhibitors in plants.

Ans: **Abscisic acid (ABA):** Abscisic acid is a powerful growth inhibitor which can induce dormancy of bud and seed. (It also promotes abscission or leaf fall).

Ethylene: Ethylene inhibits longitudinal elongation of stem and roots.

Q.4 In what way auxin is involved in the process of apical dominance?

Ans: The phenomenon in which intact apical buds suppress the growth of lateral buds is known as **apical dominance**. The chemical responsible is the auxin produced in the apical bud and it is due to downward transport of auxin produced in the apical meristem.

Q.5 What is the name of the gap between the two neurons?

Ans: Synapse is the gap between two neurons.

Q.6 What is the function of receptors in our body? What will be the conditions if the receptors are not properly working?

Ans: The receptors present in our sense organs detect stimuli, which are then passed to the CNS in the form of nerve impulses. The messages are interpreted and instructions are sent to the effectors to produce responses. If the receptors are not working properly, animals fail to detect stimuli and cannot respond properly.

Q.7 How do the reflex actions differ from the involuntary actions?

Ans: Reflex actions are the sudden, spontaneous involuntary actions whereas involuntary actions are those that cannot be controlled easily by thinking about it.

Reflex actions are controlled by spinal cord whereas involuntary actions are controlled by medulla oblongata of hind brain. Blinking of eyes is an example of reflex action while breathing rate, heart beat etc. are examples of involuntary actions.

Q.8 Explain the functions of any three hormones in human being.

Ans:

NAME OF GLAND	TYPE OF HORMONE	FUNCTION OF HORMONE
Pituitary Gland	Growth hormone	It controls overall growth of the body; over secretion causes gigantism **(giant);** and under secretion during childhood causes dwarfism **(dwarf).**
Thyroid Gland	Thyroxine	It controls carbohydrate, protein and fat metabolism for growth; Deficiency of iodine in our diet causes **goitre** characterized by swollen neck.
Pancreas	Insulin	It regulates normal blood glucose level; deficiency of insulin causes high blood glucose level leading to **Diabetes**

EXTRA QUESTIONS & ANSWERS

Q.1. Can you identify the hormone involved in ripening of fruits?

Ans. Ethylene**,** a gas hormone**,** is involved in ripening of fruits.

Q.2. Cite one function each of cytokinin and ethylene.

Ans. Cytokinin promotes cell division while ethylene hastens post-harvest maturation of fruits (ripening of fruits).

Q.3. Name the hormone responsible for changes associated with puberty in males and females respectively.

Ans. **Testosterone** in male and **Oestrogen** in females are the hormones responsible for changes associated with puberty in males and females respectively.

Q.4. State two functions of hind brain of human being.

Ans: It is responsible for controlling involuntary functions such as **heartbeat, breathing rat**e.

(Cerebellum of hindbrain also maintains body posture balance and equilibrium).

Q.5. Give one point of differences between Gibberellin and Abscisic acid.

Ans: Gibberellin is a growth promoter and stimulates elongation of internode while Abscisic acid is a growth inhibitor that induces dormancy of bud and seed.

Q.6. Give two effects of iodine deficiency in the body.

Ans: Goitre, Cretinism or hypothyroidism

Q.7. Why hormonal responses are slower than reflex actions?

Ans: Hormonal responses are slower than reflex actions because chemical messengers must travel throughout the blood stream to their target organs causing a general long lasting response unlike short lived nerve impulse that travel quicker.

Q.8. What is a neurotransmitter?

Ans: A neurotransmitter is a chemical responsible for transmission of nerve impulse across the synapse.

Q.10. What are conditioned Reflexes?

Ans: The reflex actions which develop during the lifetime due to learning or experience are called conditioned reflexes.

Q.11. Differentiate between nervous system and endocrine system.

Ans:

DIFFERENCE	
NERVOUS SYSTEM	ENDOCRINE SYSTEM
It is made up of **neurons** (and supporting cells).	It is made up of endocrine glands and their secretion called hormones.
The transmission of information occurs in the form of electrical or nerve impulse.	The transmission of information occurs in the form of chemicals.
Signal transmission is fast.	Signal transmission is slow.

Q.12. How insulin helps in controlling glucose level of blood?

Ans: Insulin stimulates uptake of excess glucose and their conversion into glycogen by promoting glycogenesis in liver and muscle cells.

Q.13. Why adrenaline hormone is called emergency hormones?

Ans: Adrenaline prepares our body for emergency or stress action. It increases the rate of heart beat and more supply of blood to skeletal muscle. The breathing rate also increases, raises blood pressure and allows more glucose to go into the blood to give more energy quickly to fight or cope with stressful situations. So, adrenaline is called an emergency hormone.

Q.14. How are our brain and spinal cord protected?

Ans: Our brain is protected by a bony cranial box, besides cerebrospinal fluid in between cranium and brain acts as a cushion and absorbs further mechanical shock. The spinal cord is lodged inside the vertebral column.

Q.15. List the functions of spinal cord.

Ans: The functions of spinal cord are:

(i) It controls reflex actions.

(ii) It conducts sensory information from skin or muscles to the CNS and transfers motor response from CNS to muscle or limbs.

Q.16. State the function of forebrain.

Ans: Fore brain is the most important thinking part of the brain (*responsible for intelligence, memory, consciousness, will power*) controls voluntary actions. It has specialized areas for vision, hearing, smell, taste, touch, etc.

Q.17. Give one point of difference between receptor and effector.

Ans: **Receptors** (Skin etc.) are specialized for detecting stimuli from the environment whereas effectors are specialized for converting a nerve impulse into a response or action.

Q,18. How adrenaline facilitates the animal body to face with hard situation? Give three points.

Ans:

(i) Adrenaline is a hormone secreted during emergency or stressful conditions into the bloodstream.

(ii) It increases heart beat and reduce blood supply to the digestive system and skin and diverted to skeletal muscles.

(iii) The breathing rate also increases thereby enable the animal to overcome hard situation.

Q.19. What could be the consequences if adrenal gland is removed from the human body? Give three points.

Ans:

(i) If adrenal gland is removed there will be no synthesis of adrenaline.

(ii) Heart beat and breathing rate will not increase.

(iii) The animal body fails to cope with emergency or hard situation.

Q.20. Explain Ivan Pavlov's experiment on conditioned reflex.

Ans: Pavlov used to ring a bell every time just before the food was presented in front of the dog in order to associate salivation with an additional stimulus of bell. The dog gradually learnt to associate the bell with food, later the dog salivated at the sound of the bell even though no food was placed. This is known as conditioned reflex.

Q.21. What are the important features of conditioned reflexes?

Ans:

(i) They are acquired during the lifetime due learning and experience.

(ii) They are not constant, may disappear or reappear again.

(iii) They are not transmitted by heredity.

Q. 22. Explain five functions of hormones in human being.

Ans:

ENDOCRINE GLAND	HORMONE	FUNCTIONS
Pituitary Gland	Growth hormone	Control overall growth and development of the body, over secretion causes gigantism **(giant);** under secretion causes dwarfism **(dwarf).**
Thyroid Gland	Thyroxin	Control carbohydrates, proteins and fat balance for growth. **Deficiency of Iodine** in our diet causes **Goitre** characterized by enlargement of thyroid gland in neck region.
Pancreas	Insulin	Regulate normal blood glucose level; Deficiency of insulin causes high blood glucose level leading to **Diabetes mellitus.**
Adrenal Gland	Adrenaline	Prepares the animal to overcome situations situation imposed during emergency. Adrenaline Hormone is also known as **Emergency Hormone** because it is released when getting stress in our body so it helps to increase heart rate hence enhancing breathing.
Gonad - Testes in male	Testosterone	Responsible for sexual changes occurring during puberty. Testosterone is produced by the Leydig Cells in testes of Adrenal Glands in men.
Gonad -Ovaries in female	Oestrogen/Estrogen	Responsible for sexual changes occurring during puberty. Estrogen is produced mainly in the Ovaries by fat cells and the Adrenal Gland. It's Primary Female Sex Hormone which is responsible for development and regulation of female reproductive system and secondary sex characteristics.

Q.23. Explain five types of tropic movement or tropism with suitable examples.

Ans: **Phototropism:** The tropic movement in response to light is called phototropism.

e.g. bending shoot towards the source of light.

Geotropism: The tropic movement in response to gravity is called geotropism.

e.g. growth of roots vertically downward.

Hydrotropism: The tropic movement in response to water is called hydrotropism.

e.g. bending of vertically downward growing root towards moisture.

Chemotropism: The tropic movement in response to certain chemicals is called chemotropism.

e.g. growth of the pollen tube towards the ovule

Thigmotropism: The tropic movement in response to touch is called thigmotropism.

e.g. tendril clinging around the support.

Q.24. Why Pituitary Gland is known as Master Gland? Where is it located?

Ans: Pituitary Gland is known as Master Gland because it regulates and controls the secretions of other endocrine hormones in the body.

It senses the body's needs and sends signals to different organs and glands throughout the body to regulate their functions and maintain an appropriate environment.

Pituitary Gland, about a size of a pea, is located sitting in the Sella Turcica of Sphenoid bone which is underneath the brain/at the base of the brain and behind the bridge of the nose.

Q.25. State the function of forebrain.

Ans: Forebrain is the most important thinking part of the brain (*responsible for intelligence, memory, consciousness, will power*). It has the centre for vision, hearing, taste, smell, and moreover controls voluntary actions.

Q25. Draw a neat labelled diagram of Human Brain.
Ans:

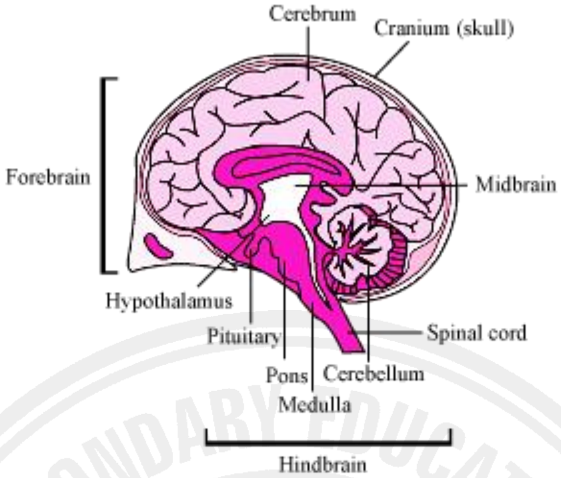
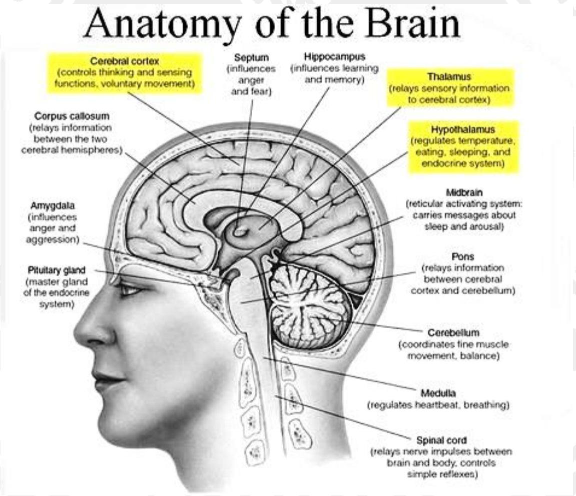
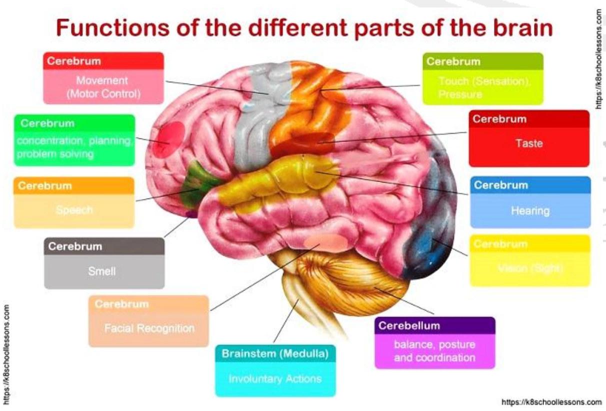
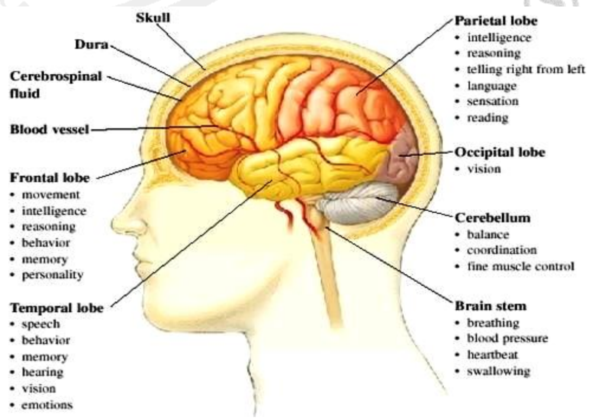


Fig. A labelled diagram of Human Brain

***For Student's Easy Understanding the functions of Human Brain through diagrammatic view**







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