Control and Coordination

CHAPTER 7

EXAM DRILL

ANSWERS

1. If the diurnal variations in the position of plant parts (*e.g.,* flowers and leaves of plants) are caused by the light stimulus, such non-directional movements are called photonastic movements. Example is dandelion flower. It opens up in the morning in bright light and closes in the evening when the light fades.

OR

Hydrotropism is water dependent movement.

2. The cavities of brain are called ventricles. These are hollow fluid filled spaces inside the brain.

3. **(d)**

4. Vomiting, sneezing and peristalsis are involuntary actions.

5. Adrenaline hormone is secreted by adrenal glands. It is also termed as emergency hormone.

6. Cut leaves remain green for longer time, when dipped in cytokinins. Cytokinins increase the shelf life. Application of cytokinins on vegetables can keep them fresh for several days.

OR

Abscisic acid is a plant hormone which functions mainly as a growth inhibitor. It promotes the wilting and falling of leaves.

7. Adrenocorticotropic hormone is secreted by anterior lobe of pituitary gland whereas calcitonin is secreted by thyroid gland.

8. Plants lack nervous system.

9. Auxin promotes growth in plants. It is synthesised at the tip of the plant stem.

OR

Testes secrete male sex hormone called testosterone. The function of testosterone is to regulate male accessory sex organs and secondary sexual characters like moustache, beard and voice.

10. (i) Gustatory receptors – These are sensitive to taste.
(ii) Olfactory receptors – These are sensitive to smell.

11. Neuron

OR

Neuroplasm is granular cytoplasm of cyton of neuron.

12. Response is the change or reaction generated in our body due to a given stimulus.

OR

Axon is a single long process of uniform thickness which conducts nerve impulses away from the cell body in a neuron.

13. Insulin and glucagon.

14. **(b)**

15. **(a) :** The cerebral cortex (outer convoluted layer of cerebrum) is the highest centre for many sensations and activities. Memory, intelligence, judgement, etc, depend on the coordinated and integrated activities of the neurons of different cortical centres of cerebrum. Thus, during operation of the tumor, some neurons present in the cerebrum might been affected and this led to loss of intelligence, memory and judgement.

16. **(c) :** The differential growth response of the plant to light, called phototropism, is caused by an unequal distribution of auxin, the higher concentration of the growth hormone being on the shaded side. The bending of the plant is caused by cells on the shaded side elongating at a much greater rate than cells on the illuminated side.

OR

(a) : In genetically dwarf plants, the length of internode is very much reduced but the number of nodes remains the same. Gibberellins overcome the phenotypic expression of dwarfism in certain plants. Besides general increase in stem length, gibberellins specifically induce internodal growth in some genetically dwarf varieties of plants like pea and maize. Gibberellins, however, have little or no effect when they are applied to the normal plant.

17 **(i)** **(c) :** X is pituitary gland, Y is growth hormone, P is dwarfism, Q is gigantism and R is acromegaly.

(ii) **(a) :** Pituitary gland (X) is also known as master of endocrine gland.

(iii) **(a) :** Y, *i.e.*, growth hormone is secreted by anterior lobe of pituitary (X) gland. TSH and ACTH are also secreted by anterior lobe of pituitary.

(iv) **(a) :** Acromegaly (R) is caused due to excess secretion of growth hormone after adolescence. Acromegaly in adults leads to overgrowth of the jaw bones and bowing of the spine (backbone).

(v) **(b) :** Melatonin is secreted by pineal gland.

18. (i) **(a) :** Tip of the seedlings contain a growth hormone called auxin which stimulates elongation of the seedling. Plant P has auxins naturally, thus it will grow normally. Tip of the plant Q is removed thus it will have no auxins. Plant R has its tip removed and the agar block placed on it has no external supply of auxin. Thus, R and Q will show slow growth. Plant S has its tip removed, but has an external supply of auxin through the agar block. Auxin supplied may be more than the naturally synthesised auxin, thus plant S will grow at the fastest rate.

(ii) **(a) :** Auxin plays an important role in both phototropic and geotropic response of the plant. In phototropism, the unilateral light leads to lateral displacement of growth hormone on shaded side of the plant, thus causing more growth on the darker side and hence the curvature of the shoot towards the source of light. Geotropic curvature is caused by displacement of hormone on the lower side of axis. The shoot curves upwards because its growth is promoted on the lower side and root curves downwards because its growth is inhibited by auxins on the lower side.

(iii) **(c) :** Auxin induces development of roots on cut ends of stems. Many plants are propagated by stem cutting. *E.g.*, rose, *Bougainvillea*. This effect of auxin is used by horticulturist for commercial purpose.

(iv) **(c) :** Indole-3-acetic acid (IAA) is the universal natural auxin.

(v) **(b)**

19. (i) **(d)**

(ii) **(d)**

(iii) **(d)**

(iv) **(c) :** Reflex action is a quick response to specific stimulus and path taken by nerve impulse in a reflex action is called reflex arc. Sensory neurons carry signals from receptors to spinal cord and motor neurons carry these from spinal cord to muscles.

(v) **(a)**

20. (i) **(a) :** Opening and closing of flowers in response to light or temperature represents nastic movements. For example, *Oxalis* opens during day and closes during night or cloudy sky represents photonasty.

(ii) **(b) :** The growth of pollen tube towards ovules is due to chemotropism. Fertilisation of flowers by pollen is achieved because the ovary releases chemicals that produce a positive chemotropic response from the developing pollen tube.

(iii) **(b) :** Seismonastic movements occur in response to touch (shock). These movements are very quick and are best seen in 'touch-me-not' plant (*Mimosa pudica*). As the 'touch-me-not' plant responds to touch stimulus, this phenomenon is also called thigmonasty.

(iv) **(a) :** Thigmotropism is the directional growth movement of a plant part in response to the touch of an object. *E.g.*, tendrils growing towards any support which they happen to touch show positively thigmotropism.

(v) **(c) :** The growth of pollen tube towards a chemical which is produced by an ovule during the process of fertilisation in a flower is an example of positive chemotropism.

21. Hormones secreted by pituitary gland alongwith their functions are :

(i) Growth hormone – It regulates overall growth or development of the body, bones, tissues and muscles.

(ii) Thyroid stimulating hormone (TSH) – It stimulates the functioning of the thyroid gland.

(iii) Prolactin hormone – It regulates the function of mammary glands in females.

(iv) Vasopressin hormone – It regulates water and electrolyte balance in body.

(v) Oxytocin hormone – It regulates ejection of milk during lactation.

OR

Human hindbrain consists of three parts-cerebellum, pons varolii and medulla oblongata.

(i) Cerebellum – It helps in maintaining posture and balance of the body. It also coordinates smooth body movements such as walking, dancing, etc.

(ii) Medulla oblongata – It controls rate of heartbeat, breathing movements, expansion and contraction of blood vessels to regulate blood pressure, swallowing, coughing, sneezing and vomiting.

22. (i) Estrogen (ii) STH (Growth hormone)
(iii) Insulin (iv) Melatonin

23. When an electrical signal reaches the axonal end of one neuron it releases certain chemical substances that cross the synapse and move towards the dendritic end of next neuron generating another electrical signal.

OR

Iodine is necessary for the thyroid gland to make thyroxine hormone. When iodine intake is low, release of thyroxine from thyroid gland will be less due to which protein, carbohydrate and fat metabolism will be affected. A child might suffer from cretinism or adult may suffer from simple goitre or myxoedema in case of iodine deficiency in the body.

24. Differences between reflex action and walking are as follows:

S. No.	Reflex action	Walking
(i)	It is inborn (inherited) and present in the individual since birth.	It is not inherited and is acquired through learning.
(ii)	It is automatic and occurs without the will of individual.	It is under the control of cerebellum part of brain and occurs with the will of individual.
(iii)	It cannot be changed.	It can be changed.

25. Movements in 'Touch me not' plant occur in response to touch. In such movements, plant cells swell or shrink due to changes in the amount of water in them (turgor changes) resulting in folding up and drooping of leaves. After sometime, the leaves come to original form. This phenomenon is called thigmonasty.

26. Adrenal medulla secretes two hormones : adrenaline (epinephrine) and noradrenaline (norepinephrine).

Adrenaline is called emergency hormone. In normal conditions these hormones are secreted in small amount. However, when a person faces stress or danger, these hormones are secreted in large amount to prepare the body to face emergency situations.

27. The plant shows response to touch as seen in 'Touch-me not plant' (*Mimosa pudica*). Sensitive plants give immediate response to the stimulus. Movement of part of plant occurs at a point different from the point of touch. Plant communicates the information that a touch has occurred. This is done in the following manner:

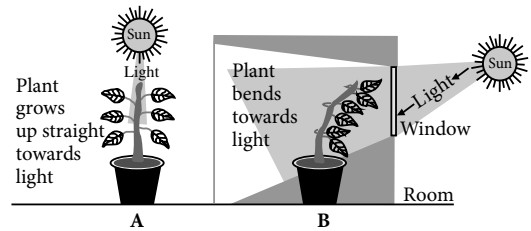
(i) Plants use electrochemical means to convey the information from cell to cell. However, there are no specialised tissues for the conduction of information.

(ii) Plant cells change their shape by changing the amount of water in them. This happens due to swelling or shrinking of cell.

OR

Phototropism is the directional movement or orientation of the plant part in response to light stimulus. If the plant part moves towards light, it is called positive phototropism. Alternatively, if the plant part moves away from light, it is called negative phototropism. For example**,** (i) Stem or shoot of a growing plant moves towards light and thus shows positive phototropism. (ii) Roots of a plant move away from light thus show negative phototropism. Phototropic movement in plant is caused due to the action of auxin hormone. Phototropism can be demonstrated by the following activity.

Take two potted plants and place one plant (A) in the open so that it receives the sunlight coming from above. On the other hand, place the other plant (B) in a room near the window in such a way that it receives sunlight from one side, *i.e.*, through the window. After some days, observe both the plants. You will notice that the first plant (A) (which was kept in the open) has grown up straight towards light. However, the second plant (B) (which was kept in the room and receiving light from one side) has grown by bending towards the light. Thus, we can conclude from this experiment that the stem of plant responds to light by showing growth movement towards light (positive phototropism).



28. **(a)** Differences between cerebrum and cerebellum are as follows:

S. No.	Cerebrum	Cerebellum
(i)	It is a part of forebrain.	It is a part of hindbrain.
(ii)	It contains various functional areas mainly concerned with intelligence, memory, etc.	It maintains posture and equilibrium.

(b) The differences between central nervous system and peripheral nervous system are as follows :

S. No.	Central nervous system	Peripheral nervous system
(i)	It consists of brain and spinal cord.	It consists of cranial nerves and spinal nerves.

(ii)	Brain is protected by the cranium which is present in the skull. Spinal cord is protected by vertebral column.	Such protective structures are not found.
(iii)	It contains centres for controlling various activities of the body.	No such controlling centres are present.

29. The information that passes through neuron in the form of electrical signals is called nerve impulse.

(i) Nerve impulse is carried by dendrite towards the cell body.

(ii) The axon of neuron transmits the nerve impulse away from the cell body.

30. **(a)** Sympathetic system increases contraction and rate of heartbeat whereas parasympathetic system decreases contraction and rate of heartbeat.

(b) (i) Axon (ii) Myelinated nerve fibre

31. The various types of tropic movements are:

(i) Phototropism: Movements which are in response to light are called phototropism. Stem shows positive phototropic movement and root shows negative phototropic movement.

(ii) Geotropism : Movements which are in response to gravity are called geotropism. Stem shows negative geotropism and root shows positive geotropism.

(iii) Hydrotropism: Movement in response to water is called hydrotropism. Stem shows negative hydrotropic movement and root shows positive hydrotropism.

(iv) Chemotropism : Movement in response to chemical stimulus is called chemotropism. Growth of pollen tube towards ovules is an example of chemotropism.

32. Differences between dendrites and axons are as follows:

S. No.	Dendrites	Axons
(i)	These are short, tapering processes.	These are long, uniform processes.
(ii)	Number of dendrites arise directly from the receiving surface of cell body.	A single axon arises from the discharging end of a cell body.
(iii)	The ends taper and do not have knobs at the tips of branches.	Terminal branches of each axon enlarged to form knobs.
(iv)	These contain Nissl's granules and neurofibrils.	These do not possess Nissl's granules. However, neurofibrils are present.
(v)	These acquire sensations and send nerve impulses to the cell body.	These carry nerve impulses away from the cell body.

33. Major functions of the human brain are :

(i) It coordinates activities of the body so that mechanism and hormonal reactions of the body work together.

(ii) It receives information carrying nerve impulses from all the sensory organs of the body.

(iii) It correlates the various stimulus from different sense organs and produces appropriate response.

(iv) It responds to the impulses brought in by sensory organs by sending its own instructions to the muscles and glands causing them to function accordingly.

(v) It stores information, so that the behaviour can be modified according to the past experiences. This function makes brain the organ of thought and intelligence.

34. **(a)** When we step on a sharp object, a reflex action occurs and we immediately withdraw ourselves from it to minimise the damage. Sequence of events occurs as below:

Stimulus is received by the receptor present in the foot and a sensory nerve impulse is generated

↓

Sensory neuron carries the impulse to the spinal cord

↓

Spinal cord analyses it and changes into a motor nerve impulse

↓

Motor neuron carries the impulse to leg muscles

↓

Leg muscles act as effectors and withdraw the foot

(b) (i) Synapse (ii) Cytokinin

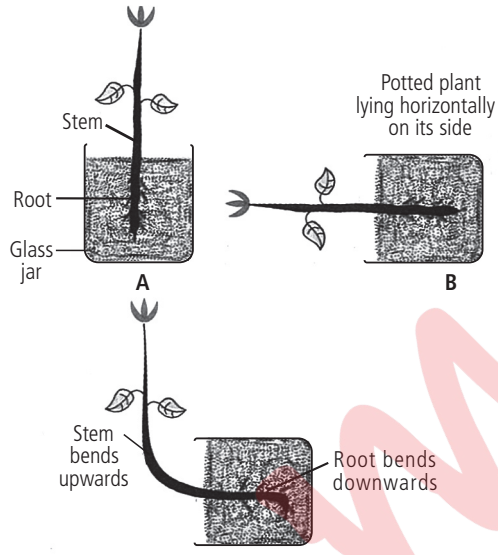
OR

(a) Geotropism is the directional movement or orientation of the plant part in response to gravity. If the plant part moves in the direction of gravity, it is called positive geotropism. Alternatively, if the plant part moves against the direction of gravity, it is termed as negative geotropism. For example roots of a plant move downward in the soil (in the direction of gravity) showing positive geotropism whereas the stem of a plant shows movement against the direction of gravity and thus showing negative geotropism.

The given activity demonstrates geotropism:

Take a potted plant growing in a transparent glass jar. Keep the potted plant growing in a transparent glass jar straight on the ground. Observe that its stem is growing upward and its roots are growing downward. (Fig. A).

Now place this potted plant horizontally on its side on the ground and observe the position of the growing stem and the root. Keep the plant in this position for a few days. After few days, you will observe that the growing stem and the growing root are parallel to the ground (Fig. B). After some more days, you will find that the stem of this plant has bent upward away from earth (negative geotropism) and the root of the plant has bent downward towards earth *(*positive geotropism Fig. C). This experiment confirms response of plants towards gravity (geotropism).



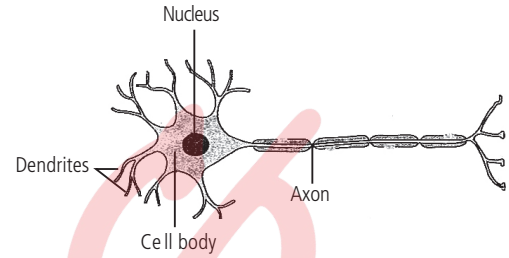
(b) (i) Auxin is a phytohormone which is basically growth promoter. It plays many important roles such as:

- Promotes cell enlargement and cell differentiation in plants.
- Induces tropism.
- Induces parthenocarpy, *i.e.*, formation of seedless fruits without fertilisation, in number of plants.
- Auxin promotes apical dominance, a phenomenon in which presence of apical bud does not allow nearby lateral buds to grow. This is because apical bud inhibits the growth of lateral buds by releasing auxins.

(ii) Abscisic acid is a phytohormone which is basically growth inhibitor. It is also called stress hormone because its production is stimulated by drought, water logging and other adverse conditions. It performs the following functions:

- It promotes dormancy in seeds and buds and thus inhibits growth.
- It promotes abscision of flower and fruits.
- It promotes falling and senescence in leaves.
- It promotes closing of stomata and thus affects transpiration and wilting in leaves.

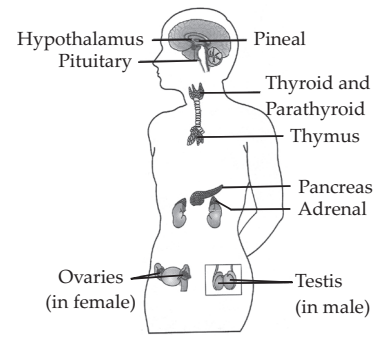
35. **(a)** Diagrammatic representation of a neuron is as follows:



(b) (i) Dendrites or dendrons acquires the information and sets off a chemical reaction that creates an electrical impulse.

(ii) The electrical impulse travels from the dendrite to cell body and then along the axon to its nerve ending. At the end of the axon, the electrical impulse sets off the release of chemicals which cross the synapse (gap) and start a similar electrical impulse in a dendrite of the next neuron. This is a general scheme how nervous impulse travel in the body.

36. Location of various endocrine glands in our body is shown below :



OR

(a) The chemical substances produced by plants for the coordination of various plant activities are called plant hormones. Auxin is a plant hormone that promotes growth.

(b) A - Pons: It regulates respiration.

B - Medulla: It controls involuntary action heartbeat, breathing movements, blood pressure, swallowing, coughing, sneezing and vomiting.

C - Cerebellum: It controls posture and balance of the body.

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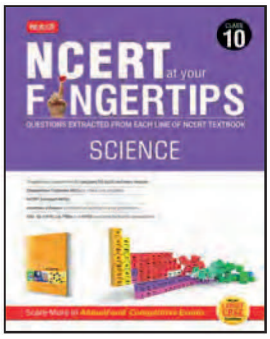

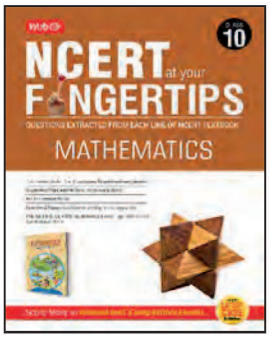

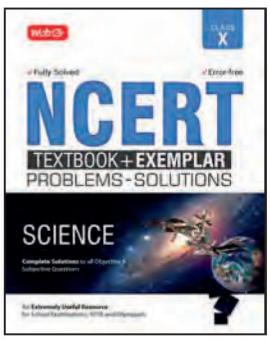

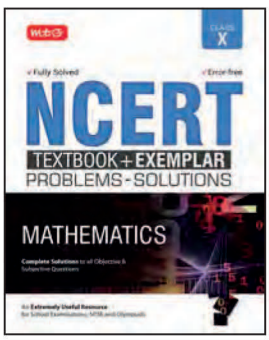

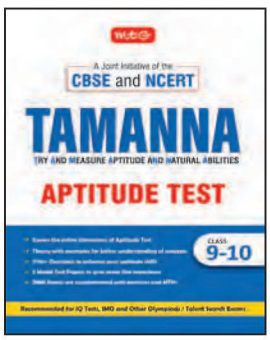

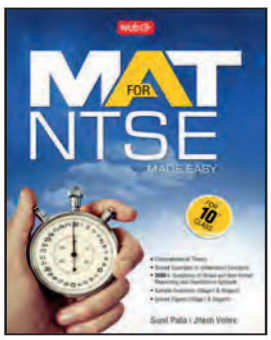

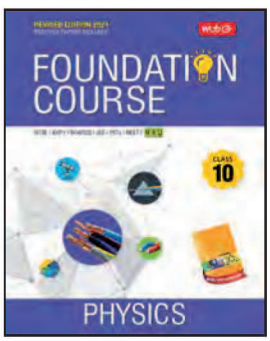

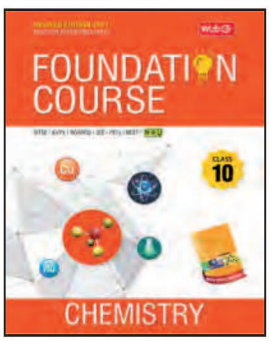

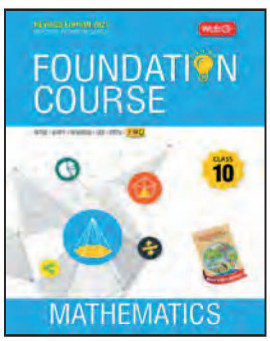

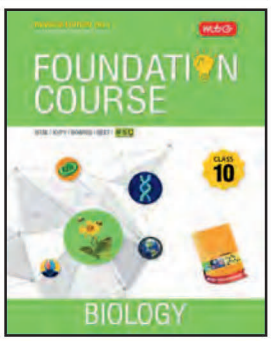

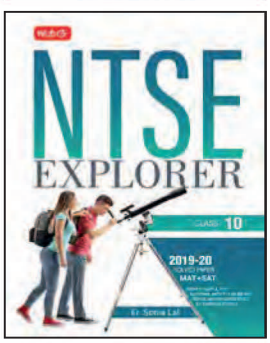

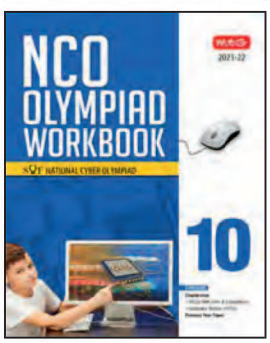

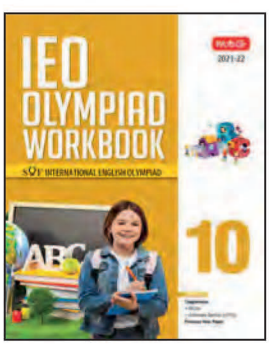

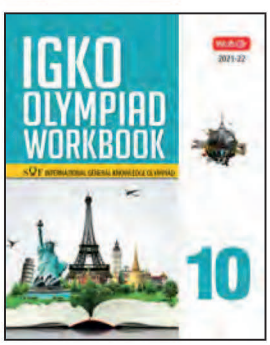

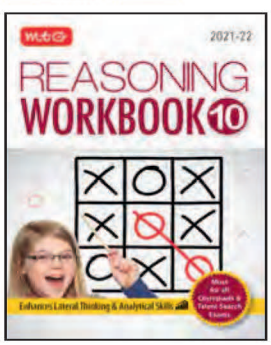

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