

# DAYAWATI MODI ACADEMY

## MODIPURAM MEERUT

Class X

### ASSIGNMENT AND NOTES - BIOLOGY

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## NOTES

### Control and Coordination

Systematic working of the various organs of an organism (plants or animals) producing a proper response to the stimulus is called co-ordination.

#### Coordination in Plants

Not so elaborate, controlled by phytohormones and external stimulus.

#### Phytohormones

- Control and coordination in plants is done by phytohormones.
- They are naturally occurring chemical substances which control one or other aspect of growth.
- Auxin – Cell enlargement and differentiation.
- Gibberellins – In presence of auxin, promotes cell enlargement and differentiation.
- Cytokinins – Promotes cell division, opening of stomata, etc.
- Abscisic acid – Closing of stomata, wilting and falling of leaves, etc.

#### Tropic Movements

- Directional plant growth movement in response to an external stimulus.
- Growth of a plant may be towards the stimulus (positive tropism) or away from it (negative tropism).
- Phototropism – movement in response to light.
- Chemotropism – in response to chemicals.
- Hydrotropism – in response to water.
- Geotropism – in response to gravity.

#### Nastic Movements

- Non-directional movement of a plant part in response to an external stimulus.
- May or may not be a growth movement.
- All parts of the organ of a plant are affected equally irrespective of the direction of the stimulus.
- Thigmonasty – Nastic movement in response to touch of an object.
- Photonasty – Nastic movement in response to light.

#### Coordination in Animals

Elaborate, very complex and is controlled by neuroendocrine system.

#### Endocrine (chemical) Coordination

- Consists of hormones (chemical messengers) regulating biological processes and secreted by endocrine glands.
- Homeostasis is maintained by hormones by their integrated action and feed back control.

#### Nervous Coordination

- Neuron forms the fundamental unit.
- Sensory neurons in sense organs receive stimulus and transmit impulses to CNS.

- Motor neurons transmit impulses from CNS to effectors.
- Relay or connector neurons serve as links between sensory and motor neurons.

### **Nervous System (Human)**

- **CNS** – Consists of brain and spinal cord.
  - Brain** – Controls various voluntary (walking, riding, running, etc.) and involuntary actions (sneezing, coughing, etc). Also controls thinking, reasoning, and intelligence.
  - Spinal Cord** – Controls reflex action.
- **PNS** – Consists of cranial nerves (12 pairs) and spinal nerves (31 pairs).
- **ANS** – Two set of nerves (parasympathetic and sympathetic) supplying visceral organs which are antagonistic to each other.

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# ASSIGNMENT

What is the difference between reflex action and walking?

**Ans.** Reflex action takes place without thought, i.e., it gives a reaction to stimuli. It is controlled by the spinal cord. It is an involuntary action. Walking takes place after thought, i.e., according to our wishes. It is controlled by a part of hind brain called cerebellum. It is a voluntary action.

2. What happens at the synapse between two neurons?

**Ans.** Synapse is the gap between nerve ending of one neuron and dendrites of another. At synapse, the electrical impulse generated at dendrites of a neuron is passed on to dendrite of another neuron in the form of chemicals by an ending of the first neuron. Synapse ensures that nerve impulse travels only in one direction. A similar synapse allows the delivery of impulse from the neuron to the other cells, like muscle cells.

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

**Ans.** Cerebellum, which is a part of the hind brain.

4. How do we detect the smell of an agarbatti (incense stick)?

**Ans.** Smell of an incense stick is detected by the olfactory receptors located in the fore-brain.

5. What is the role of brain in reflex action?

**Ans.** Spinal cord is made up of nerves which supply information to think about. Thinking involves more complex mechanisms and neural connections. These are concentrated in the brain, which reacts to the stimuli and is the main coordinating center of the body. The brain and spinal cord constitute the central nervous system. They receive information from all parts of the body and integrate it. Hence, brain plays an important role in reflex action.

6. What are plant hormones?

**Ans.** Plant hormones are chemicals present in plants which help to coordinate growth, development and responses to stimuli and environment. For example, auxins, gibberellins, cytokinins, abscisic acids are different plant hormones.

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

**Ans.** The movement of leaves of a sensitive plant is neither towards, nor away from the stimulus touch; it is a non-directional movement (nastic movement) while movement of shoot is towards the stimulus like light; it is a directional movement (tropic movement).

8. Give an example of a plant hormone that promotes growth.

**Ans.** Auxin is the plant hormone that helps in cell growth and elongation. Gibberellins promote growth of stem.

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

**Ans.** When tendrils come in contact with any support, the part of the tendril in contact with the object does not grow as rapidly as the part of the tendril away from the object. This is caused by the action of auxin hormone. Less auxin occurs on the side of contact as compared to the free side. As a result, auxin promotes growth on the free side and the tendrils coil around the support.

10. Design an experiment to demonstrate hydrotropism.

**Ans.** • Take a tray filled with soil.

- Plant a seedling in the tray at one end.
- To the other end add water to the soil with the help of a pipe as shown in the figure.

**Observation:** The root (radicle) of the plant seedling moves towards the wet soil. This shows that roots are positively hydrotropic.

**11.** How does chemical coordination take place in animals?

**Ans.** In animals, chemical coordination is maintained by hormones secreted by endocrine glands, which function as chemical messengers. They are released by endocrine glands directly into the blood without any involvement of special ducts from where they reach the target tissue or organ to act. These organs and tissues then respond and enables the body to deal with different situations.

**12.** Why is the use of iodised salt advisable?

**Ans.** 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. If iodine is deficient in our diet, there is a possibility that we might suffer from goitre. The thyroid gland enlarges causing swelling in the neck. Iodised common salt contains proper content of iodine. Thus, to avoid deficiency of iodine, iodised salt is recommended.

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

**Ans.** Adrenaline hormone is secreted in large amounts when a person is frightened, or mentally disturbed. When it reaches the heart, it beats faster to supply more oxygen to our muscles. The breathing rate also increases because of the contractions of diaphragm and the rib muscles. It also raises the blood pressure, and allows more glucose to enter into the blood. All these responses together enable our body to deal with the emergency situations.

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

**Ans.** Diabetes is caused due to less or no secretion of hormone insulin by pancreas. In such a person, blood sugar level is high. Insulin converts extra sugar present in blood into glycogen. Thus, patients suffering from diabetes are given insulin injection to control their blood sugar level.

## QUESTIONS FROM NCERT TEXTBOOK

**1.** Which of the following is the plant hormone?

- (a) Insulin
- (b) Thyroxine
- (c) Oestrogen
- (d) Cytokinin

**Ans.** (d) Cytokinin

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

- (a) dendrite.
- (b) synapse.
- (c) axon
- (d) impulse.

**Ans.** (b) synapse.

**3.** The brain is responsible for

- (a) thinking.
- (b) regulating the heart beat.
- (c) balancing the body.
- (d) all of the above.

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

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

**Ans.** The receptors in our body collect information about changes in the environment around us in the form of stimuli. They are located in our sense organs such as the inner ear, nose, tongue, eye, etc.

These then pass the information in the form of nerve impulses to central nervous system (spinal cord and brain) where message is interpreted and instructions are sent to effectors which reveal responses.

When receptors do not work properly, the environmental stimuli are not able to create nerve impulses and body does not respond.

**5.** Draw the structure of a neuron and explain its function.

**Ans.** Functions: The information acquired at the end of the dendritic tip of a neuron sets off a chemical reaction which creates an electrical impulse. This impulse travels from the dendrite to the cell body, and then along the on to its end. At the end of on, the electrical impulse sets off the release of some chemicals, which cross the synapse and start a similar impulse in a dendrite of the next neuron.

In this way nervous impulses travel in the body. Thus, nervous tissue is made up of an organized network of neurons which are specialized for conducting information via electrical impulse from one part of the body to another.

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

**Ans.** Movement of shoot towards light is called phototropism. This movement is caused due to more growth of cells towards the shaded side of the shoot as compared to the side of shoot towards light. More growth of cells is due to secretion of auxin towards the shaded side.

- 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 the light coming from a window.
- After two or three days, you will notice that the shoots bend towards light and roots away from light.
- Now, turn the flask so that the shoots are away from light and the roots towards light. Leave it undisturbed in this condition for a few days.
- The old parts of the roots and shoots change directions.
- New growth in shoot is in direction of sunlight.

**Conclusion:** Shoot shows phototropism.

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

**Ans.** (a) Reflex action

(b) Impulses from various body parts will not be conducted to brain.

(c) Message from brain will not be conducted to various organs of the body.

**8.** How does chemical coordination occur in plants?

**Ans.** In plants, chemical coordination occurs with the help of plant hormones (phytohormones). Different plant hormones help to coordinate growth, development, and responses to the environment. They are synthesized at places away from where they act and diffuse to the area for action, for example, auxin promotes cell growth, gibberellins promote stem growth, cytokinins promote cell division and abscisic acid inhibits growth and its effects include wilting of leaves.

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

**Ans.** The body of a multicellular organism consists of a number of components and sub-components and each is specialized to perform a particular function. Therefore, it is necessary that various organs of the body of an organism work together in a proper manner for proper functioning to a stimulus. In human beings nervous system and endocrine system work together to control and coordination.

**10.** How are involuntary action and reflex action different from each other?

**Ans.** (a) Involuntary action involves autonomic nervous system.

- (i) They occur in response to internal stimuli.
- (ii) They are connected with functioning of internal body parts.
- (iii) It occurs without the will of the organism. E.g., heartbeat, breathing, etc.
- (iv) These are regulated by medulla oblongata (hind brain).

(b) Reflex action involves all parts of voluntary nervous system though they are not voluntary.

- (i) They operate against harmful stimuli which are generally external.
- (ii) They are connected with emergency i.e, response to stimuli.
- (iii) Some reflexes involve the brain, rather than the spinal cord.
- (iv) Reflex action is generally controlled by spinal cord.

**11.** Compare and contrast nervous and hormonal mechanism for control and coordination in animals.

**Ans.** In human beings, the nervous system controls the various functions by small units called neurons. Neurons receive the information through sensory nerves and transfer them through motor nerves. Whereas, hormones coordinate the activities and growth of the body. Important functions like sugar level metabolism, growth and development etc. are controlled by hormones secreted by endocrine glands. Hence, in human beings, hormones show long lasting responses. The action of hormones is highly specific.

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

**Ans. Movement in a sensitive plant**

- (i) It occurs in response to an external stimulus like touch and shock.
- (ii) Plant cells change shape by changing the amount of water.
- (iii) No nerves are involved.
- (iv) There is no specialized tissue in plants for conduction of information.
- (v) Plant cells do not have specialized proteins.

**Movement in our legs**

- (i) It occurs in response to our requirements and is a voluntary action.
- (ii) Movement in our legs is voluntary action which is controlled by cerebellum part of hind brain.
- (iiip) Nerves carry the message for movement of legs.
- (iv) There is specialized nervous tissue in animals for conduction of information and muscle cells to help in movement.
- (v) Animal cells have specialized protein which help muscles to contract or relax.

Dr,

# NOTES

## Life processes

- Constantly exhibit the functions of maintenance and repair in living organisms
- Some Examples- Digestion, Respiration, Circulation etc.

### **Nutrition**

- Process of obtaining nutrients from the environment i.e. intake of food and then its digestion in the body.
- Two types – Autotrophic (self-sufficient for food) and Heterotrophic (dependent on others for food).

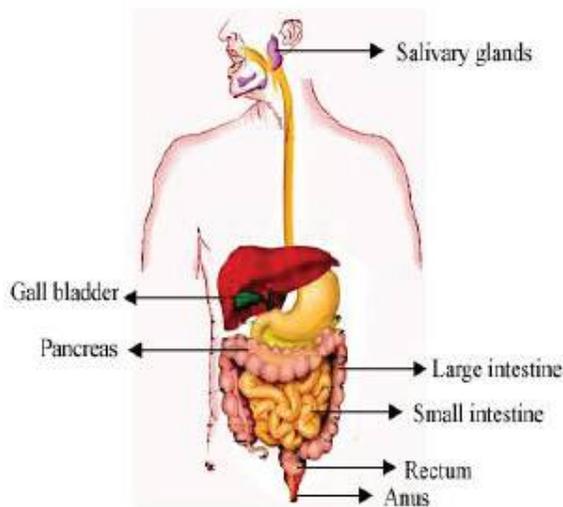
### **Autotrophic nutrition**

- Synthesis of food by photosynthesis- 'photo' means light and 'synthesis' means production. It is the production of food with the help of sunlight.
- Photosynthesis equation-  
$$6\text{CO}_2 + 6\text{H}_2\text{O} \text{ give } \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$$
- Events of photosynthesis are as follows: Absorption of light energy chlorophyll which is the green pigment and gives energy for activation of reaction. Then the splitting of water into its constituent's hydrogen and oxygen leading to the Synthesis of ATP and NADPH<sub>2</sub> and finally reduction of CO<sub>2</sub> to carbohydrates.

### **Heterotrophic nutrition**

- Generally take up energy from plants and animals by using them as food.
- Mostly of three types—holozoic, parasitic, and saprophytic.
- Digestion- mechanical and chemical reduction of ingested nutrients which can be then converted to energy for use.
- Human digestive system- consists of the long alimentary canal that includes mouth, pharynx, oesophagus, stomach, small intestine, large intestine, rectum and anus.
- Organs for assistance- pancreas, liver

### **Nutrition in humans:**



- Saliva is secreted by salivary glands located under the tongue which contains digestive enzymes like salivary amylase, which break down starch into sugar. So, digestion of carbohydrates starts in the mouth itself.
- Tongue helps in chewing, moistening, rolling and swallowing of food.

- The food from mouth then goes down the oesophagus, which is the food pipe to the stomach, through the movement of walls of oesophagus (peristalsis)
- Stomach mixes the food hence received with various digestive juices.
- Inner lining of stomach secretes:
  - Mucus – protects the lining of stomach from being corroded by the acid.
  - Hydrochloric acid – creates an acidic medium and dissolves bits of food.
  - Digestive juices – break down protein into simpler substances.

The food from stomach eventually moves into the small intestine.

- Digestion in small intestine: It is the longest part (about 7.5 m long) of alimentary canal. It is the site where complete digestion of carbohydrates, proteins, and fats takes place. It gets intestinal juices from two different glands – liver and pancreas that help in the further digestion of food.
  - Liver is the largest gland of the body and secretes bile juice. Bile juice is stored in the gall bladder and has a significant role in the digestion of fats.
  - Pancreas has enzymes that help in total digestion of all food components.
    - The digestive tract and associated glands together constitute the digestive system.

### Respiration

- It is controlled by enzymes and energy is released from the breakdown of organic substances. It is of two types that are aerobic and anaerobic

#### Aerobic respiration

- Oxidation of food materials by oxygen
- Produces 36 ATP
- The steps followed in cellular respiration

**First step** is breakdown of glucose (6C) into pyruvates (3C) in the cytoplasm

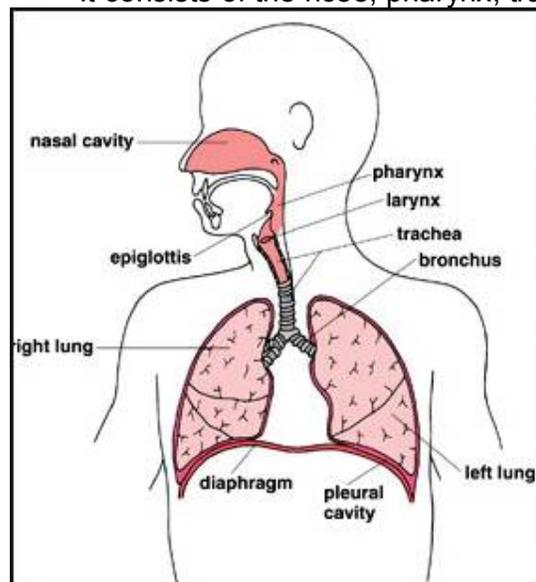
**Second step-** Pyruvate is then broken down to CO<sub>2</sub> and water and it takes place in the mitochondria where energy is produced in ATP form.

#### Anaerobic respiration

- It is the Oxidation of nutrients without using up the molecular oxygen
- It gives 2 ATPs.
- **First step-** glycolysis in cytoplasm, 2 pyruvate produced
- **Second step is the** break down of pyruvic acid into ethanol and water and energy (in yeast) and lactic acid and energy (in muscle cells)

#### Human respiration

- It consists of the nose, pharynx, trachea, bronchi, bronchioles and alveoli



- Bronchioles then divide into many alveoli which are sites of gaseous exchange.
- O<sub>2</sub> present in alveolar blood vessels is then transported to various cells of the body.

Hemoglobin pigment present in blood is majorly responsible for transportation of carbon dioxide and oxygen.

### Transportation

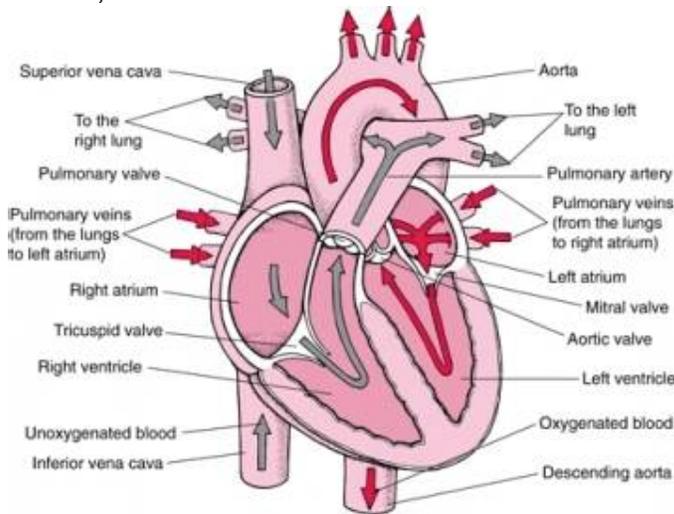
First and foremost things, a liquid medium is required always for transportation.

#### Transportation in humans

• Double circulation occurs in human beings i.e. the blood goes through the heart twice during each cardiac cycle.

- Blood and lymph are both involved in transportation
- Components of blood are RBCs, WBCs, platelets, and plasma.
- Three types of blood vessels are arteries, veins and capillaries.
- Arteries carry oxygenated blood in them, except one that is pulmonary artery
- Veins carry deoxygenated blood in them, except pulmonary vein

The Human heart is divided into four chambers – right auricle, right ventricle, left auricle, and left ventricle



- The Right side of the heart gets deoxygenated blood from different cells of the body
- The Left side of the heart receives oxygenated blood from lungs.

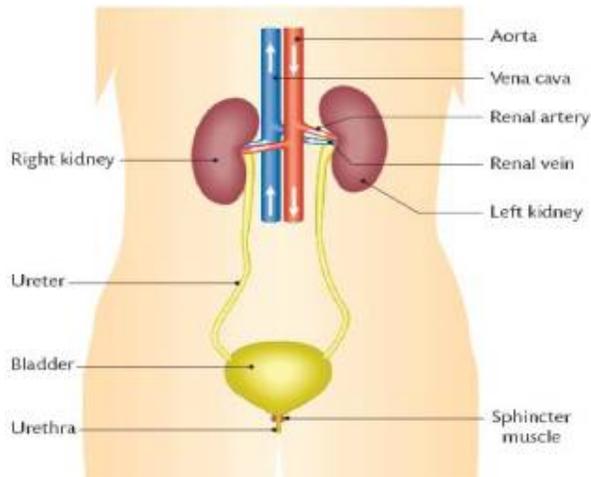
#### Transportation in plants

- Transportation of water is through xylem tissues
- Transport of water occurs due to transpiration pull, root pressure and difference in pressure gradient.
- Transport of food or translocation takes place through phloem and it requires energy.

#### Excretion

It involves the removal of harmful metabolic wastes from the body of organisms by various processes.

#### Excretion in humans



The excretory system consists of- a pair of kidneys, a pair of ureters, a urinary bladder, and a urethra.

- Nitrogenous wastes such as urea and uric acid are removed
- Nephron- basic filtration unit
- Main components of the nephron - glomerulus, Bowman's capsule, renal tube
- The process of Removing of nitrogenous wastes through artificial kidney is called **dialysis**.

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## **ASSIGNMENT**

1. How is 'respiration' different from 'breathing'? Explain the process of aerobic and anaerobic respiration.
2. I) Name the blood vessel that brings oxygenated blood to the human heart.  
II) Which chamber of the heart received oxygenated blood?  
III) Explain how is the oxygenated blood from this particular chamber sent to all the body parts?
3. Explain the schematic representation of gaseous exchange in tissues.
4. Compare the functioning of alveoli in the lungs and nephrons in the kidneys with respect to their structures and functioning?
5. What is the significance of emulsification of fats?
6. Why is the small intestine in herbivores larger than in carnivores?
7. What is the advantage if a four chambered heart?
8. Explain the process by which inhalation occurs during breathing in human beings?

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