NUTRITION

BL-1

1.1 NUTRITION :

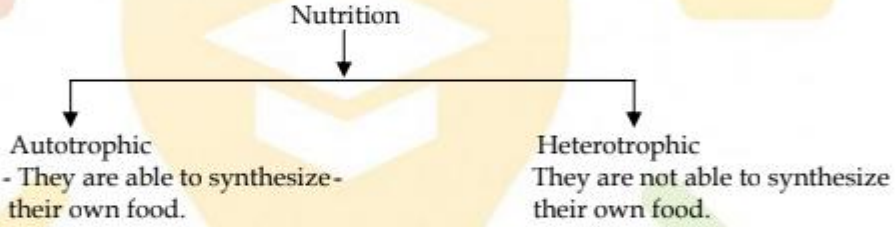
"Nutrition" is a process of intake as well as utilization of nutrients by an organism. It is the process of breakdown of nutrients into smaller molecules and their absorption. Food provides us nutrition and energy. It contains different types of nutrients in varying amounts according to the need of our body.

1.1 (a) Nutrients :

These are the substances required by our body for its growth, repair, work and maintenance of the body. Different types of nutrients are carbohydrates, fats, proteins, vitamins, mineral etc. Our daily energy need may vary according to our occupation, age, sex and under some specific conditions.

1.2 MODES OR NUTRITION :

There are several modes of nutrition on the basis of which organisms are classified as follows :



1.2 (a) Autotrophic :

(Auto = self, trophic = food) It is a mode of nutrition in which organisms prepare their own food. Inorganic molecules like CO_2 and H_2O are converted into organic molecules like carbohydrates in the presence of sunlight and chlorophyll. **e.g. Green plants.** Autotrophs are further categorized. as :

(i) Photoautotroph : Those which utilize sunlight for preparing their food

(ii) Chemoautotroph : Those which utilize chemical energy for preparing their food.

1.2 (b) Heterotrophic :

(Hetero = different ; trophic = food) It is a mode of nutrition in which organisms derive their food fro some other animals or plants. They cannot prepare their own food **e.g. human being**. Heterotrophs are further categorized depending on the nature of food they consume :

(i) Herbivores : Animals which eat only plants, **e.g. Cow, goat** etc.

(ii) Carnivores : They feed on flesh of other animals, **e.g. Lion, vulture** etc.

(iii) Omnivores : T hey feed on plants and animals both **e.g. Dog, human** etc.

(iv) Detritivores : Feed on detritus or dead organic remains, **e.g. Earthworm** etc.

(v) Sanguivorous : Feed on blood **e.g. Leech, female mosquito** etc.

(vi) Frugivorous : Feed on fruits, **e.g. Parrot** etc.

(vii) Insectivores : Feed on insects, **e.g. Bats** etc.

1.2 (c) On the Basis of Mode of Feeding Organisms are Categorised As :

(i) Holozoic : They ingest mostly solid but sometimes liquid food. **e.g., Amoeba, human** etc.

(ii) Saprotrophic : they absorb organic matter from dead and decaying organisms with the help of their enzymes. **e.g., Bacteria, fungi** etc.

(iii) Parasitic : They derive their nutrition from other living plants or animals e.g. **Plasmodium round worms** etc.

Nutrition can be divided into two categories on the basis of occurrence

↓

Nutrition in plants | Nutrition in animals

1.3 Nutrition in Plants:

- Plants are autotrophic in nature. They prepare their own food hence they are called as **producers.**
- They contain a green pigment called chlorophyll which can entrap solar energy which is then converted into chemical energy in the form of food and the process is called as **"Photosynthesis".**

1.3 (a) Photosynthesis :

(i) Definition : The synthesis of organic compounds like glucose from simple inorganic molecules like CO_2 and H_2O by the cells of green plants having chlorophyll in the presence of sunlight is called as photosynthesis.

(ii) Equitation of photosynthesis : Photosynthesis is a two step process.

$$6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2 + 6H_2O$$

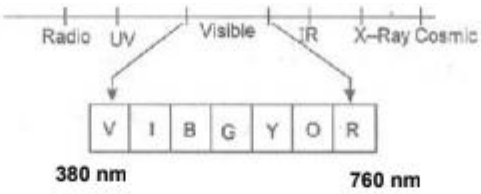
(A) Light reaction : AT, $NADPH_2$ and O_2 are produced.

(B) Dark reaction : CO_2 & H_2O are converted into glucose.

• Photosynthesis essentially requires two things :

1.3 (b) Sunlight :

- For plants sun the basis source of radiant energy.
- Plants utilize the light in the visible region of solar spectra (electromagnetic spectrum) which comes under the range of 390 nm - 780 nm.
- Visible region consists of white light which is a mixture of 7 lights of different wavelengths.



- Maximum photosynthesis occurs in red region.
- There is minimum photosynthesis in green region because green parts of plants reflect whole of the green light.

1.3 (c) Chlorophyll :

These are the green pigments present in chloroplast. They are found in green leaves in a maximum amount as well as in other green aerial parts of plant. There are six different types of chlorophyll, they are chlorophyll a,b,c,d,e and bacteriochlorophyll, amongst them chlorophyll a and chlorophyll b are the most commonly occurring chlorophylls.

• Besides chlorophyll certain other pigments are also present in plants like.

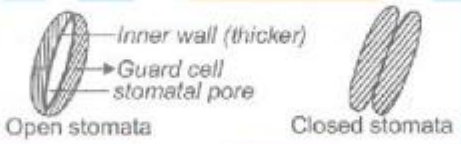
(i) Carotenes : Orange in colour **e.g. Carrot.**

(ii) Xanthophylls : Orange yellow in colour **e.g. Maize.**

(iii) Phycobilins : Different colour like red, violet **e.g. Blue-green algae, brown algae** etc.

1.3(d) Raw Materials of Photosynthesis :

(i) Carbondioxide : Terrestrial plants obtain carbon dioxide from the atmosphere through the small openings present on leaves called as stomata. **'Stomata'** are the small pores present on the surface of leaves. They help in exchange of gases and water. Stomata opening is guarded by the presence of guard cells (kidney shaped). Aquatic plants obtain CO_2 dissolved in water through their general body surface so they perform more photosynthesis than terrestrial plants.



(ii) Water : Plants absorb water from the soil by the process of osmosis. This water is transported to leaves by a special type of tissue called as **xylem.**

• Plants utilize carbon dioxide during photosynthesis, the intensity of light at which amount of CO_2 used during photosynthesis becomes equal to the amount of CO_2 released during respiration by plants in called as **Compensation point.**

• Compensation point occurs at low light intensity that is during morning and during evening hours.

1.3 (e) Site Photosynthesis :

Site of photosynthesis is different in prokaryotes and eukaryotes.

• **In prokaryotes :** Photosynthesis occurs in lamellar chromatophores.

• **In eukaryotes :** Photosynthesis occurs in chloroplast.

• **Exception : Fungi** (It lacks chlorophyll so no photosynthesis occurs here).

• In higher plants chloroplast in the main site of photosynthesis.

• Chloroplast is also called as green **plastid.**

• Plastid was first observed by **Haeckel.**

• Plastids are of 3 different types on the basis of pigments present in them.

(i) Leucoplast : White in colour, found in underground parts, lacks and coloured pigment. Helps in storage of protein (Aleuroplst), oil (Elaioplast), starch (Amyloplst)

(ii) Chloroplast : Colour other than green found in aerial parts on the plants

(iii) Chloroplast : Contain green pigment, called as chlorophyll.

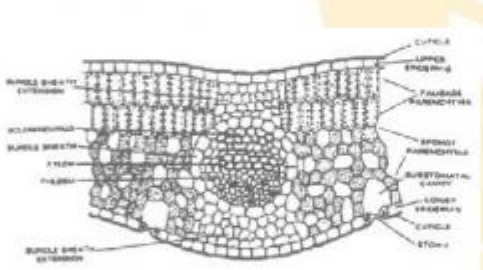
• Chloroplast was discovered by **Schimper.**

• Number of chloroplasts is variable in different species of plants.

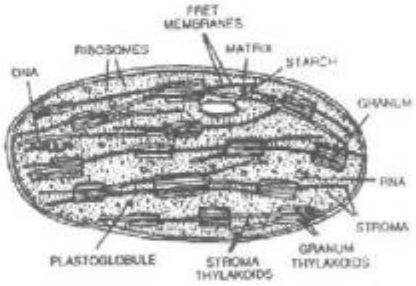
• In lower plants like algae they are 1 or 2 number.

• In higher plants their number varies from 40 -100 per palisade cell or more.

• Chloroplast also have variable shapes, for example cup shaped, ribbon shaped etc. in algae while it is discoidal in higher plants.



T.S. of leaf



Chloroplast

• A typical structure of chloroplast is a double membranous structure having two parts.

(i) Grana : It is a lamellar system consisting of stacks of granum lamella each bounded by a membranous box called as **thylakoid.** They are 40 - 60 per cell. Number of thylakoids per grana is 50 or more Chlorophyll molecules are found inside the thylakoid membrane where they trap solar energy in the form of small energy packets called **'photon'** or **'quanta'**. Grana are interconnected to each other by a channel called as **stroma lamellae** or **Fret's channel.**

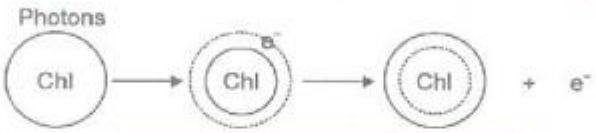
(ii) Stroma : It is a non pigmented proteinaceous matrix in which grana remain embedded. It contain enzymes for dark reaction.

1.3 (f) Mechanism of Photosynthesis :

(i) Light reaction :

- It is also called as photochemical process.
- It was discovered by → **'Robert Hill'** therefore it is also called as **Hill's reaction/**
- **Site :** Grana of chloroplast.
- **Raw materials :** Light and water.
- **Regulation :** This process is regulated by chlorophyll molecules.
- **It consist of 3 steps :**

(A) Photo excitation of chlorophyll molecule : During this process chlorophyll molecule receives sunlight in the form of small energy bundles called as **photons** and become excited to higher energy level.



(B) Photolysis : It is also called as photoxidation of water, this takes place in presence of Mn^{+2} and Cl^- ions.

$2H_2O \longrightarrow 4H^+ + O_2 + 4e^-$

O_2 is liberated as by product and H^+ ions are used for reduction of NADP

$2NADP + 4H^+ \longrightarrow 2NADPH_2$

(C) Photophosphorylation : During this process ATP are produced. It takes place in **quantasomes.**

Mg^{+2} ions and inorganic phosphate is required to convert ADP $\longrightarrow$ ATP, ADP + iP $\longrightarrow$ ATP.

(ii) Dark reaction :

- It is also called as **thermo chemical reaction.**
- It was discovered by **Melvin calving and benson** therefore it is also called as **Calving cycle** Site = Stroma of chloroplast.
- **Raw materials :** They require CO_2, $NADPH_2$, ATP and Enzymes.
- **Regulated by :** Light reaction and enzymes.
- **It involves three basic steps :**

(A) Carboxylation : In this step CO_2 is captured by CO_2 acceptors like RUBP (C3 Plants) PET (C4Plants) with the help of **carboxylase enzyme** i.e. RUBISCO & PEPCO respectively.

(B) Synthesis : This phase cap true CO_2 is assimilated into glucose in the presence of phosphatase and isomerease enzymes and RUBP is regenerated back.

(C) Regeneration of RUBP

1.4 FACTORS AFFECTING PHOTOSYNTHESIS :

1.4 (a) Light ;

Normally plants utilize sunlight but marine algae can perform photosynthesis even in the moon light. Plants can also perform photosynthesis in the artificial lights.

- Highest rate of photosynthesis : Red light
- Minimum photosynthesis : Green light
- Very high light intensity can cause reduction in the rate of photosynthesis by causing

(i) Decrease in transpiration rate

(ii) Denaturation of chlorophyll molecule

1.4 (b) Temperature :

Optimum range = 25^0 C to 30^0 C

It ranges from 10^0 - 40^0 C

In some forms like algae of hot spring $\rightarrow$ 60^0 - 70^0 is normal

1.4 (c) Carbon dioxide :

It is the first limiting factor 0.03 - 0.1% is present in the atmosphere concentration of CO_2 $\propto$ rate of photosynthesis.

above 0.9% $\propto \frac{1}{\text{Rate}}$

between 0.1 to 0.9%, it is constant and it is called as saturation point.

1.4 (d) Oxygen :

O_2 acts as competitive inhibitor of CO2. Over concentration of O_2 stops photosynthesis.

1.4 (e) Chlorophyll :

Chlorophyll content is directly proportional to rate of photosynthesis. No photosynthesis occurs in etiolated cells, In variegated leaves it occurs only at places where chlorophyll is present.

1.5 SIGNIFICANCE OF PHOTOSYNTHESIS :

Photosynthesis is a boon to the nature and to the human beings. It has following significance :

(i) Production of food material

(ii) Atmospheric control and purification of air.

DAILY PRACTIVE PROBMES # 1

OBJECTIVE QUESTION

1. The raw materials for photosynthesis are

(A) CO_2 & O_21 (B) sunlight and CO_2 (C) water and chlorophyll (D) CO_2 and water.

2. Most of the photosynthesis (80%) which takes place on this earth is carried out by

(A) green plants on land (B) algae present in fresh water

(C) algae found in ocean (D) algae present in ocean and fresh water sources.

3. Which of the following ahs no digestive enzyme ?

(A) Saliva (B) Bile (C) Gastric juice (D) Intestinal juice

4. Plants are green in colour because

(A) they absorb green light only (B) they reflect green light

(C) they absorb green light but reflect all other lights (D) none of the above are correct.

5. Full name of N ADP is

(A) Nicotinamide dinucleotide phosphate (B) Nicotine adenine dinuceotide phosphate

(C) Nicotinamide adenine dinucleotide phosphate (D) None of the above

6. Wavelength of visible light is

(A) 200 - 400 nm (B) 400 - 700 nm (C) 700 - 900 nm (D) 100 - 200 nm

7. The presence of sugar in onion leaves can be tested with

(A) iodine (B) copper sulphate solution

(C) lime water (D) benedict's solution

8. Chemical reaction takes place during dark reaction of photosynthesis is

(A) photolysis (B) hydrolysis

(C) carbon dioxide is bonded with RUBP (D) nitrogen fixation

9. Dark reaction and light reaction of photosynthesis takes place in

(A) stroma and grana of chloroplast respectively (B) grana and stroma of chloroplast respectively

(C) grana only (D) stroma only

10. CO_2 acceptor during dark reaction of photosynthesis is

(A) RUBP (B) PEP (C) NADPH (D) ATP

SUBJECTIVE QUESTIONS

VERY SHORT ANSWER TYPE QUESTIONS

1. Define photosynthesis ?
2. Name the different modes of nutrition and classify them with one example of each ?
3. Name the site of light and dark reaction of photosynthesis ?

LONG ANSWER TYPE QUESTIONS

4. Explain how water and temperature influence the rate of photosynthesis ?
5. Describe the structure and role of chloroplast along with a well labelled diagram ?
6. Describe the mechanism of photosynthesis ?
7. Explain the process of 'Photosynthesis' in plants. List four factor which influence this process and describe how each of them affects the rate of the photosynthesis. **[Delhi, 2005]**
8. Explain the following aspects of photosynthesis in plants :
   (i) The role of chlorophyll
   (ii) Dark reaction
   (iii) Calvin - Benson Cycle.

NUTRITION

BL - 2

2.1 NUTRITION IN ANIMALS :

- Animals have highly evolved digestive mechanism that includes two basic components :
- **Alimentary canal :** Long, hollow, tubular structure consisting of various organs for digestion.
- **Digestive glands :** They secrete enzymes/hormones which help in digestion.
- **Digestion in animals consist of following steps :**
- **Ingestion** : The process of intake of food.
- **Digestion** : It is the breakdown of large and complex molecules into simpler, smaller and soluble forms.
- **Absorption** : Taking up of the digested food through intestinal wall to blood.
- **Assimilation** : In this process absorbed food in taken by body cells.
- **Egestion** : The process by which undigested matter is expelled out.
- Digestive system is regulated by various hormones secreted by some endocrine glands.
- Alimentary canal was first of all developed in the phylum Platyelminthes but only mouth was present in them.
- Coiled and well developed alimentary canal was developed in annelida till mammals.

2.2 NUTRITION IN LOWER ANIMALS :

2.2 (a) Nutrition in Amoeba :

It is a unicellular organism living in water.

- Mode of nutrition of **holozoic.**
- The process of obtaining food is the **phagocytosis** (cell eating)
- Steps involved in digestion of amoeba are :

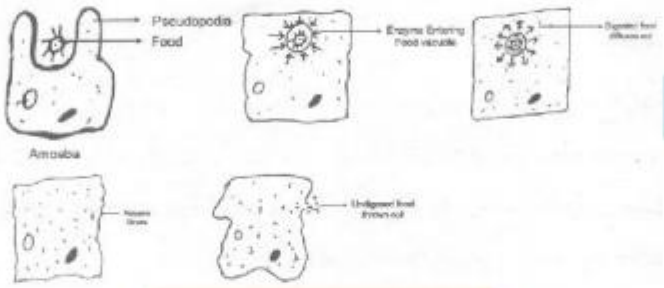
(i) Ingestion : Since it is unicellular so a single cell is responsible for carrying out all the vital activities. Food is ingested with the help of **pseudopodia.** Animal engulfs the food particle lying near it by forming pseudopodia around it and forming a **food vacuole** while is considered at its **temporary stomach.**

(ii) Digestion : The enzymes from surrounding cytoplasm enter the food vacuole and break down the food into smaller & soluble forms.

(iii) Absorption : The digested food is now absorbed by cytoplasm by simple diffusion and then the food vacuole disappear.

(iv) Assimilation : The food absorbed in amoeba is used to obtain energy from respiration, for its growth and reproduction.

(v) Egestion : Undigested food is thrown out of the cell.



2.2 (b) Nutrition is Grasshopper :

- It has a well developed digestive system having an alimentary canal and digestive glands.
- The various organs of digestive system of grasshopper are

Mouth → Oesophagus → Crop → Gizzard → Stomach → Ileum → Colon → Rectum.

- **Glands associated with it are :**

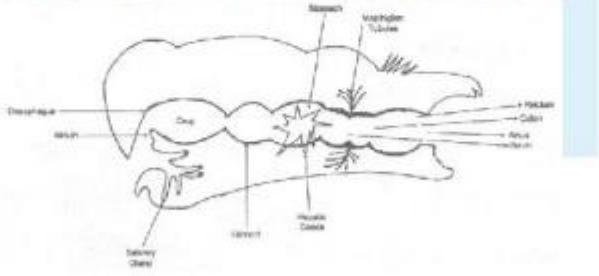
(i) Salivary glands **(ii) Hepatic caeca**

- Digestive system of a grasshopper can be divided into three parts.

(i) Foregut : mouth to gizzard

(ii) Midgut : gizzard to ileum (actual stomach)

(iii) Hindgut : stomach to anus.



- **The process involves:**

(i) Ingestion : If feeds on green leaves so it takes food through its mouth with the help of it's forelegs and mouth parts.

(ii) **Digestion:**

(A) It starts from the mouth.

(B) A pair of salivary glands secretes saliva and release it into the mouth through the salivary duct.

(C) Saliva mixed with food and lubricates and soften the food.

(D) Digestion of starch begins here.

(E) This slightly digested food enters into the crop through a food pipe i.e. esophagus.

(F) Crop stores the food temporarily.

(G) Now the food moves to gizzard. Here it is finally crushed and masticated an then moves to stomach.

(H) In stomach hepatic caeca release its secretions in the form of digestive enzymes, thus the food is then completely digested at this site.

(iii) Absorption : The digested food moves to small intestine (ileum) and absorbed through its walls.

(iv) Assimilation : Nutrients are assimilated whenever required by the cells for the fulfillment of the growth, energy and repair of the body.

(v) Egestion : Undigested food is then passed through hindgut (where H_2O absorbed) and expelled out through anus in the form of elongated dry faecal pallets.

• The excretory organ of the grasshopper is malphigian tubules present at the junction of hindgut and midgut.

2.3 NUTRITION IN HUMANS :

- Humans have highly evolved and complicated digestive system consisting of an alimentary canal and different types of digestive glands.
- Alimentary canal consist of following organs :

2.3 (a) Mouth :

It is small slit through which food is ingested.

2.3 (b) Buccal Cavity :

Mouth opens into a chamber called as **buccal cavity.** Roof of buccal cavity is called hard palate. At the floor of this cavity thick muscular structure is present called tongue. it helps in chewing swallowing, testing and speaking. Tongue has various types of papilla having **taste buds.**

• Jaws present in buccal cavity are provided with four different types of teeth :

(i) Incisors	:	For cutting
(ii) Canines	:	For tearing
(iii) Premolars	:	For grinding
(iv) Molars	:	For grinding

• Dental formula of humans :

(A) Milk teeth → These are temporary, arise at 6 - 11 month age, 20 in number

$$\frac{\text{Half upper jaw}}{\text{Hlaf lower jaw}} = \frac{2102}{2102}$$

(B) Permanent teeth → arise at 6 – 12 years, 32 in number

$$\frac{\text{Half upper jaw}}{\text{Half lower jaw}} = \frac{2123}{2123}$$

• Three pairs of salivary glands are found in mouth which release their secretions into the buccal cavity.

2.3 (C) Oesophagus :

Also called as food pipe. It leads the food from mouth to stomach, Oesophagus has highly muscular walls, no digestion occurs here.

2.3 (b) Stomach :

It is a 'J' shaped bag present on left side of abdomen. It contains several branched and butular glands present on the inner surface of its wall, which secret gastric juice.

23 (e) Small Intestine :

It is a coiled and narrow tube having 3 regions : Duodenum , jejunum, ileum.

• On the inner wall of small intestine numerous finger like projections are found which are called as **villi,** they increase the surface area of absorption.

• Duodenum is proximal part of small intestine receives secretion from liver and pancreas.

2.3 (f) large Intestine :

Small intestine opens into large intestine from w here the undigested food material is passed to anus through rectum. It is divided into three parts:

(i) Caecum **(ii) Colon** **(iii) Rectum**

2.3 (g) Digestive Glands :

(i) Salivary glands : 3 pairs of salivary glands are found in mouth cavity. It helps in chemical digestion. They secret at enzyme called **salivary amylase** or **ptyalin.** It helps in digestion of starch.

(ii) Gastric glands : Present in stomach. They secret hydrochloric acid, protein digesting enzymes and mucus.

(iii) Liver : It is the largest gland, secrets bile into the small intestine. Bile contains bile juice and bile pigments. Bile is alkaline in nature and it is temporarily stored in gall bladder and helps in digestion of fats, it also helps in absorption fats.

(iv) Pancreas: It lies parallel to and below the stomach. It secrets pancreatic juice into small intestine. Pancreatic juice contains tyrosine and pancreatic amylase. Besides these 2 enzymes pancreas secretes 2 hormones also i.e. :- insulin and glucagons so it has both exocrine as well as endocrine functions. Both bile and pancreatic juice are released into the duodenum by a common duct.

DAILY PRACTICE PROBLESMS # 2

OBJECTIVE QUSTIONS

1. Compensation point refers to the intensity of light at which

(A) Rate of respiration = rate of photosynthesis (B) Rate of respiration > rate of photosynthesis

(C) Rate of respiration < Rate of photosynthesis (D) None of the above is correct

2. Among the following which is a parasitic plant ?

(A) Plasmodium (B) Cuscuta (C) Amoeba (D) Rhizobium

3. The nutrition in mucor is

(A) parasitic (B) autotrophic (C) saprophytic (D) holozoic

4. In amoeba the digestion is intracellular because

(A) amoeba is unicellular (B) amoeba is multicellular

(C) amoeba is found is pond (D) amoeba is microscopic animal

5. Digestion of food in human starts from

(A) duodenum (B) small intestine (C) mouth (D) large intestine

6. The digestion of food is completed in the

(A) ileum (B) duodenum (C) stomach (D) large intestine

7. The most important function of villi in the small intestine is

(A) to provide strength to the intestine

(B) to provide space for capillaries and lacteals

(C) to provide increased surface area for absorption of digested food

(D) to provide habitat for bacteria

8. Which of the following sections does not contain enzymes ?

(A) Bile (B) Pancreatic juice (C) Intestinal juice (D) Saliva

9. Chewing is an example of

(A) chemical digestion (B) mechanical digestion (C) involuntary action (D) hydrolysis

10. The final product of digestion of carbohydrates and proteins are

(A) glycerol and amino acid respectively (B) glucose and amino acids respectively

(C) amino acids and glycerol respectively (D) amino acids and glucose respectively

SUBEJCTIVE QUESTIONS

VERY SHORT ANSWER TYPE QUESTIONS

1. Name the different steps involved in digestive process.
2. Name the excretory organ of grasshopper.
3. Give the importance of bile during digestion process, also write from where it is secreted, what is its site of action ?

LONG ANSWER TYPE QUESTIONS

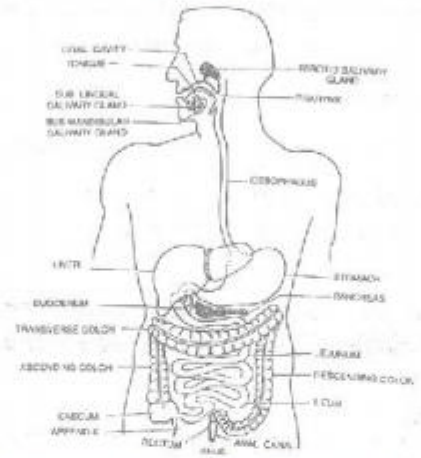
4. Draw a well labelled diagram of human alimentary canal. Mention the functions of liver in digestion.
5. Describe the digestive system of grasshopper with the help of a well labelled diagram ?
6. Explain how does the major nutrients in chapatti eaten by you in your food get digested and finally absorbed by the alimentary canal ?

NUTRITION

BL - 3

3.1 INTESTINAL GLANDS :

They secrete intestinal juice and mucus.



3.1 (a) Digestive System :

This system involves following processes :

(i) Ingestion : Intake of food is done through mouth, food is then chewed and masticated and sent to esophagus through pharynx by swallowing.

(ii) Digestion : Saliva secreted in buccal cavity starts digestion of starch into maltose. This partly digested food is then passed to stomach by esophagus through peristaltic movement. Food is churned in stomach for about three hours and broken down into smaller pieces. Due to presence of hydrochloric acid, medium of stomach becomes acidic. In acidic medium protein digestive enzyme pepsin breaks down proteins into peptones. Gastric Lipase is also secreted here which partially breaks down lipids.

- Secretion of gastric juice is stimulated by the sight, smell or thought of food.
- Now the partly digested food moves to small intestine i.e. in the duodenum. Duodenum receives the secretion from liver and pancreas through a common duct they are bile and pancreatic juice, and alkaline in nature. So the digestion and emulsification of facts occurs at this place.
- Here in the duodenum fats are emulsified by bile, remaining proteins are digested by trypsin and starch by pancreatic amylase.

NOTE : Duodenal wall secretes bicarbonate ions which make the medium alkaline.

- This partially digested food now enters in the ileum where intestinal juice i.e. **"Succus entericus"** is secreted. At this place digestion is completed.

Carbohydrates ⟶ Glucose

Proteins ⟶ Amino acids

Fats ⟶ Fatty acids and glycerol

(iii) Absorption : After digestion molecules are broken down into simpler water soluble forms now they are to be utilized, so they pass through the wall of small intestine which contains blood capillaries and enters into the blood. For absorption of fat lymph capillaries are present called as lacteals.

NOTE : Wall of small intestine have tiny finger like projections called **villi,** they increase the surface area for absorption.

(iv) Assimilation : The process of utilizations of food is called assimilating. The nutrients dissolved in blood are carried to all parts of the body where they are utilized.

(A) For building up and replacement of cells.

(B) For obtaining energy. This energy is released by the process of oxidation during respiration.

(v) Egestion : The undigested food is then collected in large intestine where water is absorbed and remaining waste is expelled out or egested through anus.

DAILY PRACTICE PROBLEMS # 3

OBJECTIVE QUESTIONS

1. In amoeba the digestion of food is

(A) extracellular (B) intracellular (C) intercellular (D) none of the above

2. Through mastication of food is essential because

(A) mastication of food makes the teeth stronger

(B) it makes the process of swallowing the food easier

(C) by this process bigger pieces of food are broken down into smaller pieces.

(D) bigger pieces of food are broken down into smaller pieces and saliva is properly mixed with it

3. The wave of contractions that pushes the food through the alimentary canal is called

(A) peritoneum (B) peristalsis (C) cyclosis (D) polarisation

4. In amoeba absorption of the digested nutrients occurs in

(A) contractile vacuole (B) plasma membrane (C) cytoplasm (D) pseudopodia

5. Coiled and well developed alimentary canal first developed in

(A) Protozoans (B) Mammals (C) Arthropods (D) Poriferans

6. Digestion of starch starts from

(A) stomach (B) intestine (C) esophagus (D) mouth

7. The path taken by food material after ingestion is represented by

(A) Mouth → Pharynx → Oesophagus → Stomach

(B) Mouth → Pharynx → Oesophagus → Small Intestine

(C) Mouth → Oesophagus → Stomach → Pharynx

(D) Oesophagus → Mouth → Pharynx → Stomach

8. Teeth involved in cutting of food material are called

(A) canines (B) incisors (B) molars (D) premolars

9. Ptyalin enzyme is secreted by

(A) salivary glands (B) mouth (C) esophagus (D) stomach

10. Villi are present on

(A) stomach (B) large intestine (C) small intestine (D) mouth

SUBJECTIVE QUESTIONS

VERY SHORT ANSWER TYPE QUESTION

1. What is the product formed during C_3 cycle of dark reaction of photosynthesis ?

2. Where does the absorption of food takes place ?

3. Name five different types of glands involved in human digestive system

LONG ANSWER TYPE QUESTIONS

4. Explain various digestive glands present in man along with their secretions & functions.

5. Explain dark reaction of Photosynthesis.

6. What is photophosphorylation ? Explain cyclic and monocyclic photophosophorylation in brief.

7. What are the various factors that affect photosynthesis explain each of them in brief ?

8. **(i)** Explain why the rate of photosynthesis in plants is low both at lower and higher temperatures ?

(ii) Is green light most or least useful in photosynthesis and why ?

(iii) Describe and activity to show that chlorophyll is necessary for photosynthesis in plants.

[CBSE, 2005]

9. What is the function of gizzard in grasshopper. Draw a labelled diagram showing the digestive system of grasshopper ? **[CBSE, 2005]**

10. What is the importance of the following process occurring during photosynthesis in plants ?

(i) Emission of electrons from chlorophyll (ii) Photolysis of water **[CBSE 2004]**

11. What is meant by utilization of food ? Name the digestive gland of grasshopper.

ANSWERS

DAILY PRACTIVE PROBELSM # 1

Qus.	1	2	3	4	5	6	7	8	9	10
Ans.	D	D	B	B	C	B	D	C	A	A

DAILY PRACTIVE PROBLEMS # 2

Qus.	1	2	3	4	5	6	7	8	9	10
Ans.	A	B	C	A	C	A	C	A	B	B

DAILY PRACTIVE PROBLEMS # 3

Qus.	1	2	3	4	5	6	7	8	9	10
Ans.	B	D	B	A	C	D	A	B	A	C

TRANSPORTATION

BL - 4

4.1 INTRODUCTION :

All living bodies need nutrients and oxygen in every cell of its various tissues to sustain life. The transport of different material and gases is essential both in plants and animals. Unicellular organisms e.g. Amoeba and Paramecium do not require the transport of any material. These are in direct contact with their surroundings from where they obtain these nutrients. These substances are distributed in the cytoplasm due to the streaming movements of cytoplasm called as **cyclosis. They** exchange gases from the external environment directly by diffusion due to the difference in the concentration in and outside their body. In higher organisms both plants and animals, digested food, oxygen, hormones, waste nitrogenous substances etc. are to be carried from one place to the other. So transportation of materials is essential. It is done through circulatory system.

4.1 (a) Transportation in Higher Plants :

The higher plants have specialized system for the transportation of materials inside the body. The transportation of material is carried out by means of vascular tissues of the plants. The vascular tissues act as pipes or vessels. Through these vessels or pipes, water, minerals, salts, food etc. are transported in the plant body. In plants the medium of transportation is water. Water and food flows through the xylem (tracheids and vessels are the constituents of xylem) and phloem (sieve tubes and companion cells) for various metabolic activities. Tracheids and vessels are nonliving parts of xylem while sieve tubes and companion cells from the living parts of phloem. The terrestrial (land) plants absorb water and mineral salts through their roots. The area of young roots where most of the absorption takes place is the root hair zone. Root **hair are the extensions of the epidermal cells.** Root hair are delicate and do not live more than two days. The root hair have sticky walls by which they adhere tightly to soil particles. The root hair absorb water from soil by the process of osmosis but take in mineral salts by diffusion. The water and mineral salts are transported from the roots to the leaves, flowers and other parts of the plant. The upward movement of cell sap (water and minerals) through the xylem is called **"ascent of sap".**

4.1 (b) Translocation :

Phloem Translocates the manufactured food (sugar) or starch from the leaves to the leaves to the different parts of the plant including the roots.

4.1 (c) Transpiration :

Most of the water absorbed is lost through the aerial parts of the plant into air by a process called **"transpiration". Two** percent of total water absorbed is used up in various metabolic activities in the plant

body. Transpiration is the loss of water from the living tissues of the aerial parts of the plant in the form of water vapours. There are three types of transpiration :

(i) Cuticular transpiration (through cuticle)

(ii) Lentiular transpiration (through lenticels)

(iii) Stomatal transpiration (through stomata)

- **Importance of transpiration :**

(A) It controls the rate of absorption of water from the soil.

(B) It is responsible for ascent of sap.

(C) It regulates the temperature of the plant.

(D) Mostly water absorbed by roots is lost by transpiration without serving any purpose. The energy spent by the plants in transpiration is wasted. So transpiration is a necessary evil.

4.1 (d) Differences in Function of Xylem and Phloem :

	Xylem		Phloem
(i)	Functional xylem ells are dead.	(i)	Functional phloem cells are alive.
(ii)	It carries mineral salts, water and traces of organic molecules	(ii)	An organic solution of sugars and amino acids is translocated.
(iii)	The movement is only upward.	(iii)	The movement can be upward or downward.

4.2 TRANSPIRATION COHENSION THEORY :

The main loss of water is through stomatal transpiration. Turgor pressure in the mesophyll cells of the leaf forces water outwards through the cell wall. Water evaporates from the surface of the cells into the air spaces of the spongy tissues and then passes into the outer atmosphere through the pores or stomata. The cell sap of mesophyll cells becomes concentrated by losing water and causes ad drop in turgor pressure. As a result water is sucked from adjoining mesophyll cells and ultimately from vascular tissues. This tension is transmitted all the way down to the unbroken column of water through the stem to the absorbing parts of the root. The molecules of the water show cohesion (mutual attraction) and molecules of water and vessel wall show adhesion (affinity for water). Due to these adhesive and cohesive forces, water column does not break but pulled upward by the force called as **"transpiration pull". The** whole process can be compared with a person (transpiration pull) pulling a bucket full of water (forces on water column) from a well with a rope (column of water due to cohesion).

4.3 TRANSPORTAION IN HUMANS :

In humans there is a circulatory system that uses blood or lymph as carries of materials (fluid exchange medium) and the heart as the pumping organ to help in circulation. Circulatory system consists of blood vascular system (blood as carrier) and lymphatic system (lymph as carrier).

4.3 (a) Blood Vascular System :

The higher multicelluar animals with higher metabolic rates posses a well developed blood vascular system. This system helps in the quicker supply of nutrients and oxygen to the body tissues and also in the

rapid disposal of toxics waste material and carbon dioxide. The blood acts as the circulatory fluid. Blood vascular system consist of blood, blood vessels and heart.

(i) Blood : The blood is a specialized kind of living connective tissue which is made to circulate, by the muscular pumping organ called as **the heart.** In adult human beings there is 5.5 to 6 liter of blood. The blood consists of fluid part, the plasma. The red blood corpuscles (RBSs), white blood corpuscles (WBCs) and blood platelets are present in the plasma. The formation of blood is called **"Hempieces".**

(ii) Plasma : The plasma consist of water (90% & above) inorganic substances. In the plasma RBCs, WBCs and blood platelets float. Inorganic salts (09%) are also present. The organic substances are glucose, amino acids, proteins, hormones, digested and waste excretory products. The blood proteins (7%) are **fibrinogen, albumin, globulin and prothrombin.**

NOTE : Serum is plasma from which fibrinogen is removed.

(A) Red Blood Corpuscles (RBCs) or Erythrocytes : The number of RBCs is about 5.5 million in 1 ml of blood. The total number of RBC is about 30 billion. Each RBC is a **biconcave disc-like structure devoid of nucleus.** The mammalian erythrocytes do not possess nuclei, mitochondria and endoplasmic reticulum. The erythrocytes contain hemoglobin. Hemoglobin consist of globin (protein) and F^{2+} porphyrin compels (haeme). 100 ml of blood contains 15 mg of hemoglobin. if the amount of hemoglobin in blood is less, the person suffers from anemia The hemoglobin carries oxygen to the different cells of the body and brings carbon dioxide from the cells. The life span of a RBC is 120 days.

(B) White Blood Corpuscles (WBCs) or Leucocytes : The number of leucocytes is comparatively fever i.e. one ml of blood contains 5000 - 10000 leucocytes in humans. The total number of WBCs is about 75 millions. The number of leucocytes increases in infections like **pneumonia, blood cancer** (Leukemia) etc. These are large in size and contain nucleus. White blood corpuscles are of two types :

• **Granulocytes :** In granulocytes the cytoplasm contains granules and the nucleus is multliobed. Bosophils, Eosinophils and Neutrophils are three different types of granulocytes. **Eosinophils** and **neutrophils** are phagocytic (engulf and kill harmful microbes) in nature and this process is called as **"phagocytosis".** The function of **basophils** is to release histamine and Heparin.

• **Agranulocytes** : Monocytes and lymphocytes are two different types of agraulocytes. **Lymphocytes** secrete antibodies which destroy microbes. The **monocytes** are phagocytic in nature.

(C) Blood platelets : These are small and without nuclei. Their number various from 0.15 to 0.45 million in 1ml of blood. Their normal life span is one week. These help in blood clotting at the site of injury by liberating **thrombosplastin.**

4.3 (b) Functions of Blood :

Blood performs the following functions :

• **Transpiration of nutrients :** The digested and absorbed nutrients like glucose, amino acids, fatty acids are first transported to the liver and then to all the tissues for their storage, oxidation and synthesis of new substance.

• **Transportation of respiratory gases :** The respiratory gases (oxygen, carbon-dioxide) are transported by the blood. Oxygen is transported from the respiratory surface (lung, skin and buccal cavity) to the tissues and carbon dioxide from the tissues is taken to the respiratory organ for its removal.

• **Transportation of excretory products :** Different wastes from the different parts of the body are collected by the blood and then taken to the organs (kidneys, lungs, skin and intestine) from where they are exerted.

• **Transportation of hormones :** Hormones are produced by endocrine glands. These hormones have target organs (p lace to act). These are carried by the plasma of blood and bring about the coordination in the working of the body.

• **Maintenance of pH :** the plasma proteins act as buffer system and maintains required pH of the body tissues.

• **Regulation of body temperature :** The blood flows in all the parts of body, so it equalizes the body temperature. It carries heat from one place to another place in the body.

• **Transportation of metabolic intermediates :** The blood carries metabolic intermediates from one tissue to another for further metabolism. In the muscle cells due to anaerobic respiration lactic acid is produced. This lactic acid is carried to the liver for further oxidation.

• **Water balance :** The blood maintains water balance to constant level by distributing it uniformly in the body.

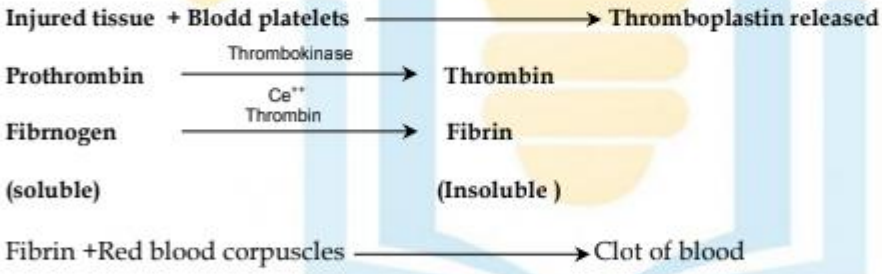
• **Protection from diseases :** The WBCs (eosinophils, neutrophils, monocyts) engulf the bacteria and other disease causing organisms by phagocytosis. The lymphocytes produce antibodies to neutralize the action of toxins produced by pathogens.

• **Clotting of blood :** Blood forms a clot at the site of injury and thus prevents the further loss of blood.

• **Support :** Blood flows under pressure in arteries. Due to this tissues become stiff as in the case of erection of nipples, clitoris and penis.

4.3 (c) Blood Clotting :

At the site of injury of the blood vessels, the platelets induce blood coagulation through the release of **thromboplastin** (thrombokinase). Thromboplastin changes prothrombin of blood plasma into thrombin. Thrombin converts soluble protein fibrinogen to insoluble fibrin. Fibrin forms a network which entangles RBCs and blood platelets to form plug or **clot** over the inured area. Blood clotting is usually completed within 2-3 minutes.



4.3 (d) Blood Groups :

Land Steiner discovered that blood of different individual did not match each other but there were biochemical differences. He discovered Antigens A and B and blood groups **(ABO systems).** Antigen (agglutinogen) is a glycoprotein present on RBCs. For each antigen there is a corresponding antibody. Thus there are two antibodies (agglutinin) a and b occurring in the blood plasma. There are four types of blood groups depending on the presence or absence of these antigens.

Table : Blood Group : Antigen and Antibody		
Body Group	Antigen present on RBCs	Antbody in plasma
A	A	b
B	B	a
AB	AB	None
O	None	a,b,

Blood is a life saving fluid. It is often needed during accident and operation. The transfusion of blood is only done when blood group is known. These groups are A,B,AB and O. Blood of O group is a universal donor i.e. it an donate blood to any group (a, AB, B and O) but it can receive blood from O blood group. A B group is universal recipient (receiver). It an receive blood from any group (A, B, AB, O) but it can donate to AB group only.

4.3 (e) Blood Transfusion :

The transfusion of blood from a healthy person to a patient suffering from blood loss due to injury or surgical operation is called a **"blood transfusion".** For this all major hospitals have **blood banks** where blood is collected from voluntary and professional donors. Before preservation the blood is tested for its blood group and Rh factor. Though theoretically a patient may be able to receive blood of two or more types, it is always advisable to have the donor blood of the same group as that of the recipient. Rather the blood of donor is always crossmatched before transfusion to exclude any change of incompatibility. When blood from a donor is added is added to blood of the recipient, it is necessary to avoid bringing together corresponding antigen and antibody. This causes clumping of RBCs. Thus antigen A in RBCs of group A individuals reacts with antibodies of plasma of group B individuals. This phenomenon is called **"agglutination".**

Table Human blood groups and transfusion

Blood group of donor	Blood group of recipient			
O	O	A	B	AB
	√	√	√	√
A	x	√	X	√
B	x	X	√	√
AB	x	X	x	√

√ Compatible

x Incompatible

Rh factor (in blood) can be genetically determined. Most of the people (more than 85%) are Rh positive (Rh^+) while a few are Rh negative (Rh^-). Both people lead normal life. If an Rh^- woman marries with an Rh^+ man then Its pregnancy is normal but in 2nd pregnancy the mother with Rh^- blood may lose the baby due to incompatibility of Rh factor. By new techniques and procedures now the child can be saved.

DAILY PRACTIVE PROBLES # 4

OBJECTIVE QUESTIONS

1. Osmosis is the movement of :

(A) solute particles from higher concentration to lower concentration

(B) solvent particles from higher water potential to lower water potential through a semi permeable membrane

(C) solute particles from higher concentration to lower concentration through a semipermeable membrane

(D) solvent particles from lower water potential to higher water potential.

2. The ultimate cause for the movement of water against the gravity in a tree is

(A) osmosis (B) transpiration (C) imbibitions (D) photosynthesis

3. Which one of the following is connected with transport of water in plants ?

(A) Phloem (B) Xylem (C) Epidermis (D) Cambium

4. Which of the following contributes most to transport of water from the ground to the leaves of a tall tree ?

(A) Breakdown of ATP (B) Capillary rise of water is xylem

(C) Cohesion of water and transpiration pull (D) Root pressure.

5. The process of transpiration in plants helps in

(A) opening of stomata (B) absorption of CO_2 from atmosphere

(C) upward conduction of water and minerals (D) absorption of O_2 from atmosphere

6. Opening and closing of stomata is due to

(A) pressure of gases inside the leaves (B) changes of turgor pressure in guard cells

(C) effect of hormones (D) their genetic constitution

7. The carbohydrates synthesized in the leaves are transported through sieve tubes most commonly in the form of

(A) glucose (B) starch (C) sucrose (D) cellulose

8. In a closed circulatory system, blood is completely enclosed with in

(A) sinuses (B) vessels (C) heart (D) skeleton

9. An artery is a vessel that carries blood

(A) with high concentration of oxygen (B) with high concentration of CO_2

(C) away from the heart (D) both A & C

10. Values are found in veins to check the backflow of blood flowing under

(A) low pressure (B) high pressure (C) no pressure (D) atmospheric pressure.

SUBEJCTIVE QUESTIONS

FILL IN THE BLANKS :

(i) ..... is the flow of water molecules from the region of higher water potential to the region of lower water potential through a semipermeable membrane.

(ii) The osmotic entry of water into a cell is called .....

(iii) Other name for blood platelets is .....

(iv) The process of production of erythrocytes is known as .....

(v) Heart is protected by a covering known as .....

VERY SHORT ANSWER TYPE QUESTIONS

1. Explain the importance of transportation.

2. Distinguish between diffusion and osmosis.

3. How does blood clot ?

LONG ANSWER TYPE QUESTIONS

4. Explain the composition of blood. Also give functions of all it's components.

5. Explain various components of xylem and phloem.

6. Comment upon :

(i) Translocation in plants **(ii)** Xylem

(iii) Phloem **(iv)** Excretion in plants

7. What is clotting of blood' ? Write a flow chart showing major events taking place in clotting of blood.

[CBSE, Delhi 2005]

8. Name the constituents of blood. Why are white blood corpuscles called 'soldiers of the body ?

[CBSE, Delhi 2005]

9. Draw a diagram of human heart and label the following on it **[CBSE, Delhi 2005]**

(i) Aorta (ii) Pulmonary trunk (iii) Superior vena cava (iv) Coronary arteries

10. **(a)** List any four blood groups found in human beings. **[CBSE, 2005]**

(b) People of which blood group can

(i) donate blood to all groups ? **(ii)** receive blood from all groups ?

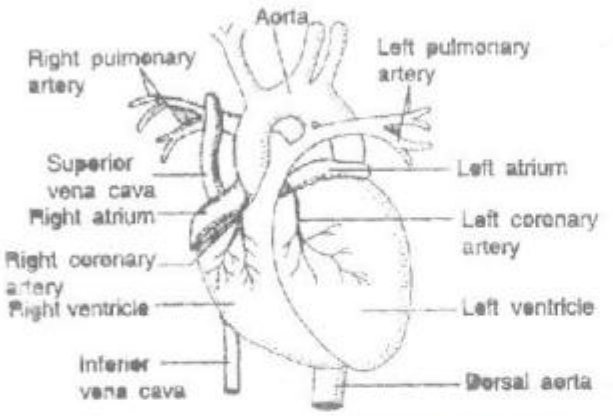
11. List two vital functions of the human kidney. Draw a labelled diagram of an artificial kidney

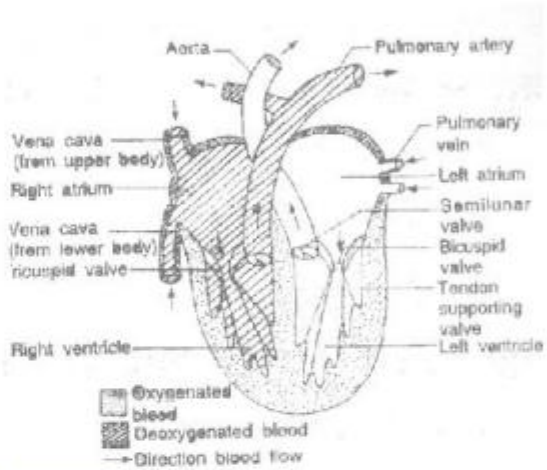
[CBSE, 2005]

TRANSPORTATION

BL - 5

5.1 STRUCTURE OF HEART





- Heart is a hollow muscular organ that lies obliquely in the thoracic region in a cavity between the two lungs that is **pericardial cavity.** It is lined by 2 layers outer and inner pericardial membranes. These are filled with a fluid called **"pericardial fluid".** It protects the heart from shock and injury.
- Heart is made up of 4 chambers : upper 2 chambers are auricles and the lower 2 chambers are ventricles. Auricles are the receiving chambers and ventricles are the pumping chambers. Walls of ventricles are thicker as they have to pump the blood.
- Partition between right and left auricle is called **"interauricular septum"** and between right and left ventricles is **"inter ventricular septum".**
- Four pulmonary veins enter into left auricle, two from each lung bring oxygenated blood. There is one auriculoventricular aperture with a bicuspid or mitral valve in left auricles which opens into left ventricle.
- Left ventricle has aortic valve having 3 semilunar cusps for large artery i.e. dorsal aorta which takes the oxygenated blood to all body parts.
- Right auricle has openings for superior venacava that brings deoxygenated blood from head, neck and upper limbs, inferior venacava receives deoxygenated blood from rest of the body and lower limbs. Blood enters into right ventricle through tricuspid valve. A coronary sinus that drains venous blood from heart muscles.

- Right ventricle has pulmonary valve having 3 semilunar cusps for pulmonary artery carrying deoxygenated blood to lungs.
- The series of events which occur during one heart beat is called as cardiac cycle.
- **NOTE :** During foetal condition a flap valve called **"foramen ovale"** is present at interauricular septum having a depression called as **fossa ovalis.** If it remains after birth it results "a hole in the heart".

5.1 (a) Blood Pressure :

It is the pressure of the flow of blood in the aorta and its man arteries. The blood pressure varies according to the contraction and relaxation of the heart. In the condition of contraction or systolic phase (Lubb sound) it is about 120 mm of Hg. This is called **"systolic pressure".** In the relaxation or diastolic phase (Dub sound) it is about 80 mm of Hg and is called **"diastolic pressure".** The normal blood pressure of man (20 years) is 120/80. Fats and anxiety increase the blood pressure, the maximum normal blood pressure should into exceed 150 in males and 140 in females. The blood pressure is measured by **"sphygmomanometer".**

5.1 (b) Detection of Normalcy of Heart Beat :

The muscle fibres of heart are specialized at certain parts generate tiny electrical currents which cause the normal heart heats. The **"electrocardiograph" (E.C.G.)** is the device to record these electrical changes. Electrocardiogram is a record of electrical behaviour of heart and remains constant in a normal man. Doctors use the E.C.G. for detection of various heart diseases. Sometimes the sinoatrial node (SA node or pacemaker) gets damaged and fails to generate cardiac impulses at normal rate it becomes abnormally slow and irregular and ventricles fail to pump the required amount of blood. It can be corrected by the surgical grafting of an **artificial pacemaker instrument** in the chest of the patient. This instrument stimulates the heart electrically at regular intervals to maintain the beats.

5.2 LYMPHATIC SYSTEM :

The lymphatic system comprises the lymph, lymphatic capillaries (simply lymphatic), lymphatic vessels and nodes. Lymph severs as the middle man between the blood and organ for exchange of any material. The lymph is the tissue fluid present in the intercellular spaces in the tissues. So it is also called as **"extracelluar fluid".** The lymph resembles the blood except that the lymph is devoid of R.B.Cs, blood platelets and some plasma proteins. Lymphatic system runs parallel to the veins. The **lymphatic capillaries** are present in the form of network under epithelial surface. The ends of lymphatic capillaries are blind. The lymphatic capillaries unite to form lymphatic vessels and these vessels resemble with the veins. The lymphatic vessels posses the valves which prevent back flow of lymph. Neighboring body muscles help in the flow of lymph. The small lymphatic vessels unite to form large vessels. Larger lymphatic vessels unite to form large ducts i.e. **right lymphatic duct** and **thoracic duct.** Right lymphatic duct opens into right subclavian vein and left thoracic duct open in to left subclavian vein. Before the lymph reaches the blood, it always passes through the **lymph nodes. The** lymph's nodes are enlargements of the lymphatic vessels. Lymphocytes and other plasma cells are present in the lymph nodes. The lympis is cleaned or filtered by lymph nodes. These cells also kill the germs and produce antibodies.

5.2(a) Functions of Lymph :

(i) It provides immunity through lymphocytes.
(ii) Fats are absorbed through lymph vessels in the intestine
(iii) It supplies digested food and oxygen to various parts of the body.

(iv) It helps in removal of waste products like parts of dead cells.

(v) It returns proteins and excess tissue fluid to the blood from the tissue spaces.

DAILY PRACTIVE PROBLEMS # 5

OBJECTIVE QUESTIONS

1. The phenomena non of uptake of water at the expense of energy by the cells and usually against the osmotic gradient is known as

(A) active absorption (B) passive absorption (C) osmosis (D) diffusion

2. Water will be absorbed by root hair when

(A) concentration of solutes in the cells sap in high

(B) plant in rapidly respiring

(C) they are separated from soil by a permeable membrane

(D) concentration of salts in the soil in high.

3. Root cap has no role in water absorption because

(A) it has no direct connection with the vascular system

(B) it has no cells containing chloroplasts

(C) it has no root hairs

(D) it has loosely arranged cells.

4. Which of the following is used in measuring transpiration ?

(A) Photometer (B) Cobalt chloride paper (C) Bell - jar (D) None of the above

5. Translocation of solutes primarily takes place through

(A) phloem (B) xylem (C) cortex (D) pith.

6. A mature human erythrocyte has the typical characteristic of

(A) a eukaryotic cell (B) a prokaryotic cell

(C) both eukaryotic and prokaryotic cell (D) neither eukaryotic nor prokaryotic cell

7. Removal of calcium from freshly collected blood will

(A) result in clotting (B) prevent clotting

(C) prevent oxidation of hemoglobin (D) cause hemolysis

8. In the cardiac cycle, diastole is

(A) the number of heart beats per minute

(B) the relaxation period after contraction of the heart

(C) the forceful pumping action of the heart

(D) the contraction period after relaxation of the heart.

9. One of the difference between blood and lymph is that

(A) blood has RBCs and WBCs while lymph has Lymphocytes.

(B) blood has RBCs while lymph has no WBCs

(C) blood has WBCs while lymph has RBCs

(D) blood has dissolved organic salts while lymph has no such inorganic salt.

10. Blood vessel carrying blood from lung to heart through

(A) Pulmonary artery (B) Pulmonary vein (C) Coronary artery (D) None of these.

SUBJECTIVE QUESTIONS

FILL IN THE BLANKS

1. The series of events which occur during one complete beat of the heart is known as ..... cycle.
2. Depression in the interauricular septum is known as .....
3. Normal blood pressure is .....

VERT SGIRT ANSWER TYPE QUESTIONS

1. Write short note on leucocytes.
2. Distinguish between open and closed circulatory system.
3. What is double circulation ?
4. Distinguish between arteries and veins.
5. Why AB+ blood group is considered as universal recipient ?

LONG ANSWER TYPE QUESTIONS

6. Explain the structure of human heart with the help of diagram.
7. Define cardiac cycle. Explain the changes occurring in heart during cardiac cycle..
8. What is lymph ? Explain its important functions. Write about its circulation.
9. Draw a diagram showing how blood in the capillaries, surrounding tissues exchange respiratory gases with cells of the tissues. Label the following on this diagram :

   (i) Red Blood Corpuscle (ii) Tissue Cell **[CBSE, 2005]**
10. Why is it essential to match the blood groups of the 'donor' and the 'receiver' persons before arranging transfusion of blood ? A person tests as 'universal donor'. which group of blood will be acceptable to him for receiving blood transfusion ?

EXERETION

BL - 6

6.1 EXCRETION :

There are various metabolic activities which take place inside the living organisms. All these activities are chemical reactions. As a result in animal body several end products are formed which are of no use to the cells. These are called as **wastes.** These must be removed from the body for proper functioning of the body. The elimination of these waste nitrogenous products form the body is called as **excretion.** Waste material is ammonia, urea, uric acid, carbon dioxide, pigments, salts digestive wastes, excess of water etc. Ammonia, urea uric acid are waste nitrogenous products, The excretory produces are both volatile and non-volatile. These are removed from the body by different methods.

6.1(a) Excretion in Amoeba :

Amoeba is an ammonotelic organism since the principal excretory product is ammonia. Special excretory organelle in Amoeba is lacking. CO_2 and ammonia are exerted by diffusing is solution through plasma membrane. The concentration of ammonia is always higher in Amoeba than in the surrounding water. The water enters through plasma membrane by **"endosmosis".** Ammonia is formed in cytoplasm by metabolism. Surplus water enters contractile vacuole. This surplus water can rupture the animal's body. Thus size of contractile vacuole increases, when the contractile vacuole is fully expanded with water, it moves towards the periphery. As it comes in close contact with the plasma membrane, the contractile vacuole bursts. Thus excess of water (surplus water) is discharged in the surrounding water, this phenomenon of controlling the amount of water in the body is called as **"osmoregulation".**

6.1 (b) Excretion in Earthworm :

In earthworm, the excretory organs are **nephridia.** The internal funnel-like opening is called as **"nephrostome".** The waste material from body cavity (coelom) enters the nephridium through nephrosome. In the inner lining of nephridium, the cells absorb useful substances like glucose.

6.2S TRUCTURE OF A TYPICAL NEPHIRIDIUM :

A typical nephridium consists of three pars : nephrostome, body and terminal duct. The nephridium communicates with the coelom (body cavity) through internal nephrostome. Nephrostome is a ciliated funnel which leads into body of nephridium through the neck. The body of nephridium consists of short straight lobe, a long spiral lobe with narrow apical part. Spiral lobe consists of proximal limb and distal limb. Neck of the nephridium leads into proximal part of spiral lobe and terminal duct leaves the proximal limb. The tubule of the neck enters the body of the nephridium and leaves the body as terminal duct. These

tubules have ciliated tracts inside. The number of ciliated tracts depends upon the number of coils of the tubules. The terminal duct may open outside by nephridiopore or into the gut (alimentary canal).

6.2 (a) Functioning of Nephridium :

Nephridia are highly vascular and extract nitrogenous wastes from the blood. The nitrogenous wastes and useful substances (glucose) enter the body of nephridium through internal neprostome in the fluid form. The cilia present in the tubule beat to move the fluid. Useful substances like glucose are reabsorbed by cells, lining the tubule and is passed into the blood. The remaining waste is discharged into the alimentary canal or to exterior through nephridiopore. According to the position of nephridia in the body of earthworm, nephridia are of three types :

(i) Septal nephridia are attached on septa. Nephridiopore is missing.

(ii) Integumentary nephridia are attached on inner side of the skin. Nephridiopore is present.

(iii) Pharyngeal nephridia are present as three p airs of groups of nephridia, on both sides of alimentary canal. Nephridiopore is absent. Septal and pharyngeal nephridia are endonephric as these open in the alimentary canal. Integumentary nephridia are ectonephric. Excretion is an adaptation to conserve water. Earthworm is ammonotelic (excrete ammonia) in excretion, in sufficient water while it is ureotellic (excrete urea) on land.

6.3 HUMAN EXCRETORY SYSTEM :

As a result of various metabolic process going on in our body a number of waste products are formed. These have to be eliminated as they are toxic to the body.

• **The waste products include :**

(i) Carbon dioxide which is liberated during respiration; and is eliminated by the lungs.

(ii) Nitrogenous metabolic wastes, such as urea and uric acid produced in the liver from excessive proteins.

(iii) Bile pigments : Bile pigments **(e.g., billrubin)** derived by the breaking down of hemoglobin of the erythrocyte.

(iv) Excess salts, water and vitamins : Concentration of these substance above the required level, is harmful to the body. Elimination of all metabolic nitrogenous wastes from the body is callers as **excretion.**

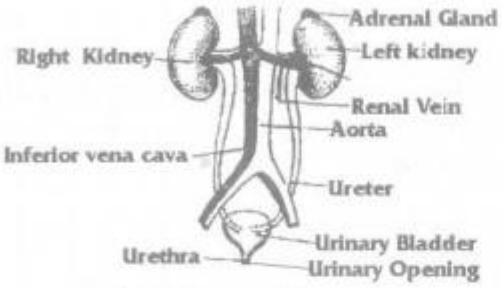
6.4 ORGANS OF EXCRETION :

(i) Lugs : Carbon dioxide produced by the oxidation of glucose or other food substances in the tissues is removed by the blood. This carbon dioxide is carried to the lungs through the blood vessels (veins) where it diffuses into the alveoli and out through the respiratory tract. Water vapour in small amount is also exhaled during expiration from the lungs.

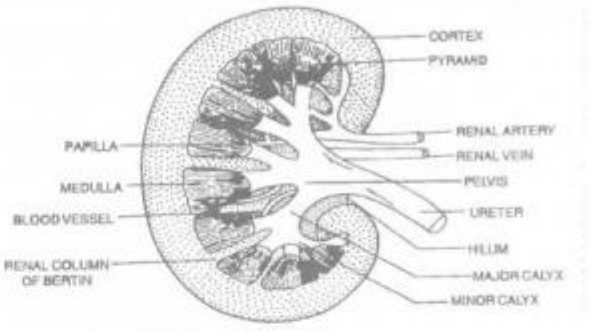
(ii) Skin : Substances like soluble food mater, oxygen, water dissolved mineral salts, traces of urea and uric acid diffuse from the thin walls of capillaries into the walls of the sweat glands. Oxygen and food substances are used for metabolic activities of the cells of seat glands but the remaining metabolic wastes are excreted out of the gland through the sweat duct which opens on the surface of the skin through sweat pore. Sweat contains 99% water, traces of urea and uric acid. However, after heavy exercise, lactic acid

forms a major constituent of seat. Profuse sweating may lead to sodium deficiency, leading to muscle cramps. An adaptation of prevention of water loss is the impermeability of our skin to water. However, in aquatic animals, skin is the major excretory organ. They excrete ammonia through their skin by diffusion as ammonia is highly soluble in water.

6.5 INTERNAL STRUCTURE OF KIDNEY :



Excretory system



L.S. of Kidney

(i) Bowman's capsule : It is a single-cells thick, double walled cup-shaped structure present in the cortex region of the kidney. The cup-shaped capsule contains a network of capillaries called **Glomerulus's.** Glomerulus's and Bowman's capsule are together called as **Renal corpuscle.**

(ii) Proximal convoluted tubule (PCT) : It starts after the Bowman's capsule and is greatly twisted. The whole PCT lies in the cortex region.

(iii) Henle's loop : Henle's loops is a U-shaped tubule located in the medulla region. it consists of

(A) a thin-walled descending limb in the medulla

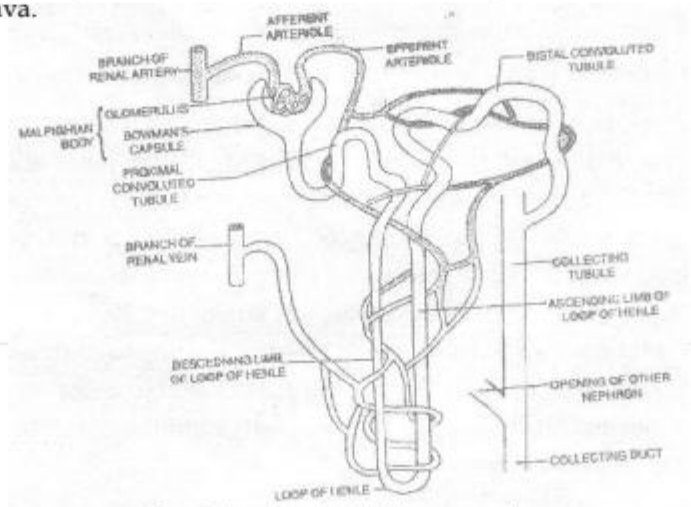
(B) a thick-walled ascending limb in the cortex. Henle's loop is long in those animals which pass hypertonic urine.

(iv) Distal convoluted tubule : The ascending limb continues into the distal convoluted tubule which forms several coils in the cortex.

(v) Collecting duct : Collecting tubule receives distal tubules of several uriniferous tubules. Several such tubules unite to form a large collecting duct. The collecting ducts are held together and converge to form a **pyramid.** The pyramid opens into the pelvis which leads into the ureter.

6.6 BLOOD SUPPLY TO NEPHTRONS :

Inside the kidney, the renal artery branches into a number of renal arterioles. A branch from a renal arteriole enters each Bowman's capsule, and is called the **afferent arteriole.** It breaks up into a network of capillaries which reunite to form a **efferent arteriole.** (Glomerulus is a mass of network of capillaries in the Bowman's capsule). The efferent arteriole after emerging from the Bowman's' capsule runs a short distance and breaks up into a capillary network which surrounds the renal tubule and rejoins to form a vein. By reuniting again and again with other veins of the kidney it forms the renal vein which drains into the posterior venacava.



Functional unit of kidney -nephron

6.7 CHEMICAL COMPOSITON OF URINE :

Normal human urine consist of about 95% water and 5% of solid wastes. Besides the normal constituents , certain hormones and medicines like the antibiotic and excess vitamins are passed out with urine. Organic compounds (gm/l): Urea - 2.3; Creatinine - 1.5; Uric acid - 0.7; Ammonia - 0.6 Inorganic Compounds (gm/l) Nacl - 19.0; KI - 12.5; H_2SO_4 - 1.8; NH_3 - 0.6. Normally a man excretes 1000 - 170 ml of urine daily, depending upon the water intake, diet, climate, mental state and physiological condition. Tea, coffee, alcohol and other beverages increases the formation of urine.

6.7 (a) Working of Nephron :

Main function of nephron is to form urine. There are three main process involved in the urine formation :

(i) Glomerular ultrafiltration : If is the filtration of body fluids and solutes from the blood, out of he glomerular capillaries into the Bowman's capsule due to the pressure in the glomerulus. All substances from the blood are filtered out except the large protein molecules. This fluid in the glomerular capsule is called as **glomerular filtrate.** It consists of water, urea, salts, glucose and other plasma solutes. Blood coming out of the efferent arteriole is therefore thick.

(ii) Tubular reabsorpiton : Glomerular filtrate contains a lot of useful materials like glucose, salts such as that of sodium and water. These substances are reabsorbed from the renal tubule at various levels and in varies proportions. **Glucose** is reabsorbed completely from the proximal convoluted tubule. More than 85% of **water** is reabsorbed from the proximal, distal and even in collecting tubules. **Sodium chloride** is reabsorbed in the proximal and distal tubules. **Potassium** and **phosphate** is completely reabsorbed from the proximal tubule. Other substances reabsorbed are uric acid, sulpahtes, vitamin C, amino acids etc.

(iii) Tubular secretion : This occurs mainly in the distal convoluted tubule and the collecting duct of the nephron. It is an active, vital process performed by the cells of the cuboidsl epithelium lining the tubules which excrete additional wastes from the blood stream into the filtrate by active transport. In this process substances like potassium, hydrogen, creatinine and certain drugs like phenol, penciling etc. are directly exerted by the tubular cells from the blood. The fluid which now flows through the last parts of the tubule is urine which consist of water, urea, uric acid, mineral ions like sodium, potassium, chlorides, phosphates etc.

6.8 ARTIFICIAL KIDNEY :

In case of loss or damage of one kidney, the other kidney performs the function of both the kidneys and the person can lead a normal life. But the failure of both the kidneys leads to death. Artificial kidney is a **dialysis** machine which cleans blood of waste products, thus acting like a kidney. The patients' blood is led from the radial artery of the arm through the machine where urea and other salts are removed and pure blood is returned to vein in the same arm. In case of permanent damage to the kidneys, dialysis has to be performed for about twelve hours, twice a week. Patients with chronic kidney failure have been recorded to survive for more than 12 years on dialysis. Now a days, diseased kidney may be replaced with healthy one by **kidney transplantation.** To lead a normal life, one healthy kidney is more than enough. Therefore, a healthy person can donate his one kidney to patient who has both kidneys impaired.

DAILY PRACTIVE PROBLESMS # 6

OBJECTIVE QUESTIONS

1. Which of the following parts of a kidney contains the lowest concentration of urea ?
   (A) Lop of Henle (B) Branches of renal vein
   (C) Bowman's capsule (D) Glomerulus
2. Uriniferous tubules of a kidney are concerned with formation of
   (A) glucose (B) amino acids (C) hormones (D) urine
3. Excretion is removal of
   (A) CO_2 (B) harmful and useless ingredients
   (C) extra water (D) metabolic wastes
4. Main function of kidney is
   (A) passive absorption (B) ultrafiltration
   (C) selective reabsorption (D) Both B and C
5. Ammonia is converted into urea in
   (A) kidney (B) spleen (C) liver (D) nephron
6. Function of loop of Henle is
   (A) conservation of water (B) formation of urine
   (C) filtration of blood (D) passage of urine
7. Urea is transported through
   (A) RBCs (B) WBCs (C) Plasma (D) All of the above
8. Major function of contractive vacuole is
   (A) excretion (B) circulation (C) osmoregulation (D) all the above
9. Which one is a accessory excretory organ
   (A) Liver (B) Stomach (C) Intestine (D) Heart

SUBJECTIVE QUESTIONS

VERY SHORT ANSWER TYPE QUESTIONS

1. Name of excretory organs of amoeba.

2. How wastes diffuse out from body of Sponge and Hydra ?

3. Flame cells are excretory organs of which group of animals.

4. Name the major excretory product of human beings.

SHORT ANSWR TYPE QUESTIONS

5. What is meant by excretion and osmoregulation ?

6. How excretion takes place in amoeba ?

7. Draw a diagram of nephron and label its various parts.

8. What is meant by osmoregulation ? How it is achieved in different groups of animals ?

LONG ANSWER TYPE QUESTIONS

9. Name the excretory organs of earthworm.

10. Draw diagram of human excretory system, label its pars.

11. Draw a labelled diagram of nephron and explain how urine is formed.

ANSWERS

DAILY PRACTIVE PROBLEMS # 4

Qus.	1	2	3	4	5	6	7	8	9	10
Ans.	B	B	B	C	C	B	C	B	D	B

DAILY PRACTIVE PROBLEMS # 5

Qus.	1	2	3	4	5	6	7	8	9	10
Ans.	A	A	C	A	A	D	B	B	A	B

DAILY PRACTIVE PROBLEMS # 6

Qus.	1	2	3	4	5	6	7	8	9
Ans.	B	D	D	D	C	A	C	C	A

RESPIRATION

BL - 7

7.1 RESPIRATION :

The sum total of all the vital activities is called as **metabolism.** Vital act ivies refer to all the physiochemical activities of a cell. It has two aspects :

(i) Anabolism : It includes metabolic process by which complex cellular compounds are synthesized from simpler compounds, **.e.g. Photosynthesis**

(ii) Catabolism : It includes metabolic processes by which larger molecules are broken down into simpler molecules, **e.g. Respiration.** Respiration is an important catabolic process responsible for the production of energy.

7.1 (a) Definition :

The process by which assimilated food is oxidized and energy is released is called as respiration. In this process oxygen from air is taken in, this oxygen reacts with food molecules present in the body cells and burn them slowly to release energy. This energy is stored in the form of ATP molecules inside the cell for further use and the waste products i.e. CO_2 and H_2O are eliminated out of the body.

$$\text{Food + oxygen} \xrightarrow{\text{Oxidation}} CO_2 + H_2O + \text{Energy}$$

It is called as aerobic respiration.

NOTE : The process by which organisms obtain oxygen from environment and release carbon dioxide produced during oxidation of food to the outer environment is called as breathing. It is a part of respiration.

7.1 (b) Difference Between Breathing and Respiration :

(i) Breathing involves taking in of oxygen and releasing out of carbon dioxide so it is a physical process while respiration is a biochemical process which, along with breathing involves oxidation of food.

(ii) Breathing involves lungs so it is an organ system level process while respiration besides being at organ system level, also occurs at cellular level.

(iii) Breathing itself do not release energy while respiration results in the release of energy which is then stored in from of ATP.

(iv) Breathing is a part of respiration while respiration is not a part of breathing but it involves breathing.

7.1 (c) Types of Respiration :

(i) External respiration : Exchange of gases between an organism and its environment.

(ii) Internal respiration : Exchange of gases between tissue cells and extra cellular environment.

(iii) Aerobic : When oxidation of food takes place in presence of molecular oxygen.

$$\text{Food} \xrightarrow{\text{Glycolysis}} \text{Pyruvic acid} \xrightarrow[\text{Kreb cycle in mitrochndira}]{\text{In presence of } O_2} 6CO_2 + 6H_2O + 38ATP$$

it is called as aerobic respiration.

(iv) Anaerobic respiration : When oxidation of food material does not require molecular oxygen or it occurs in absence of molecular oxygen, it is called as anaerobic respiration.

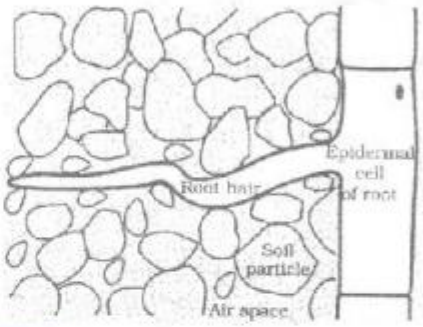
$$\text{Food} \rightarrow \text{Pyruvecacid} \rightarrow \begin{cases} \xrightarrow{\text{In yeast}} 2C_2H_5OH + 2CO_2 + 2ATP & (\textit{During fermentaion}) \\ \xrightarrow{\text{In muscles}} \textit{Lacticacid} + 2CO_2 + 2ATP & (\textit{During vigorous exercise}) \end{cases}$$

7.1 (d) Respiration :

Respiration in divided in three parts :

(i) Cellular respiration (ii) Respiration in plants (iii) Respiration in animals

7.1 (e) Respiration Plants :



• In plants exchange of gases takes place from leaves, stems and roots individually.

• Transfer of respiratory gases from one part to another is very less.

• Exchange of gases in plants occurs by simple diffusion.

(i) Respiration in roots :

• In young roots, the epidermal cells are extended to form root hair. These root hair remain in direct in contact with the air present in between the soil particles. The oxygen from this air enters into the root hairs by simple diffusion and reaches to other cells of root for respiration.

• In older roots a protective layer of dead cells is present which have tiny openings called as **lenticels.** Diffusion of oxygen takes place through these pores and carbon dioxide is released out through the same.

(ii) Respiration in stem :

• In herbaceous plants, stem have small openings in their epidermal cells called as **stomata,** the oxygen from air enters through stomata and carbon dioxide is released from the same.

• In hard and woody stems of big plants and trees, lenticels are present in place of stomata through which exchange of gases takes place.

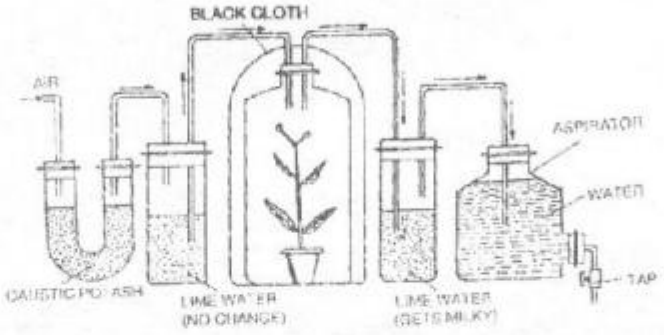
(iii) Respiration in leaves :

• Surface of leaves possess numerous tiny pores called as stomata in their epidermal cells, exchange of gases takes place through stomata and when CO_2 concentration in cell increases stomata opens and CO_2 is released out.

• An experiment to show that plants take oxygen and evolve carbon dioxide during respiration :

• **Experiment :** To demonstrate the plants take oxygen and evolve dioxide during respiration set the apparatus according to figure by taking KOH in U-tube, lie-water in two wide mouth bottles, one potted plant, bell jar and black-cloth. During day time the potted plant is covered with black-cloth to

check photosynthesis. Make the apparatus airtight and start the aspirator. After sometime you will find that the lime water of second bottle turns milky. The explanation for this is that when the water comes out from aspirator, the atmospheric air enters into the apparatus through the second end and passes through the U-tube containing caustic potash into the tube containing lime water. The caustic potash absorbs the CO_2 of the air. Thus, CO_2 free air reaches into lime water so it does not turn milky. If indicates the air does not contain even trace of CO2. When this air reaches into the lime water of second tube through a bell jar having potted plant covered with black cloth to check photosynthesis, it turns milky. It proves that CO_2 is evolved during respiration.



7.2 RESPRITAIN IN ANIMALS :

• Respiration in animals takes place as a single unit, the have different types of organs for respiration due to which mode of respiration also varies according to the organism but the basic mechanism is same.

• From phylum Protozoa to Ctenophore respiration is by generally body surface, in phylum Plathyelminthes to Nematodes are mostly anaerobic and endoparasites, in phylum Annelida cutanous membrane occurs and then from phylum Arthropoda till Mammals various respiratory organs were developed like trachea, gills and lungs.

Type of respiration	Organs involved	Example
1. Cell surface respiration	General body surface	Amoeba, Paramecium
2. Tracheal respiration	Trachea and tracheoles	Insects
3. Branchial respiration	Gills	Fishes
4. Cutanous respiration	Skin	Frog
5. Pulmonary respiration	Lungs	Amphibians, reptiles, birds
6. Buccal respiration	Buccal cavity	From

Some important characteristics of respiratory organs of animals are :

• They have large surface area to get enough oxygen.

• They have thin walls for easy diffusion and exchange of gases.

• They have rich blood supply for transport of respiratory gases.

7.2(a) Respiration in Amoeba :

In unicellular organisms like amoeba and in some lower multicellular animals likes sponges and cnidarians, respiration or exchange of gases occurs through general body surface as these cells are in direct contact

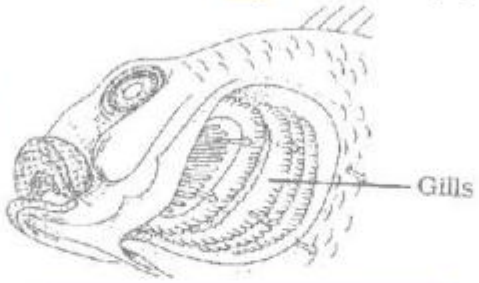
with an aquatic environment so the oxygen dissolved in water diffuses into the cell and brings about oxidation of food, at the same time carbon dioxide released is expelled out of the cell by the same process.

7.2(b) Respiration in Earthworm

In organisms like earthworm and leech exchange of gases occur through their skin as their skin is very thin and most. It is rich in blood supply so the oxygen is absorbed by moist skin of earthworm and is transported to all the cells of body through blood. The carbon dioxide from body cells diffuses into the blood and expelled out through skin.

7.2 (c) Respiration in Fish :

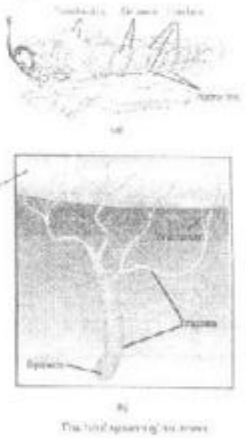
- In fish exchange of gases occurs through gills so the respiration is said to be branchial.
- Gills are present on both the sides of its head, they are covered by gill covers.



- During breathing fish takes in water through its mouth and pass it over the gills, the oxygen present in water extracted by gills and water is removed out through gill slits. This oxygen is now absorbed by blood and carried to all parts of the body and at the same time carbon dioxide is released into the blood and comes back to the gills and is expelled out into the surrounding water.
- Same type or respiratory pattern is followed in some other aquatic organisms like prawns.

7.2 (d) Respiration in Grasshopper :

- In insects there occurs a system of tiny holes and air tubes all over the body these tiny holes or openings are called as **spiracle.** This whole system facilities the exchange of gases and is called as **tracheal system.**
- During breathing oxygen of air enters the spiracle and reached to each and every part of grasshopper's body through trachea and tracheoles and carbon dioxide produced during respiration is carried back by trachea and tracheoles to the spiracles and is expelled out of the body of insect.
- The same mechanism is followed in other insects like houseflies, mosquitoes, bees etc.

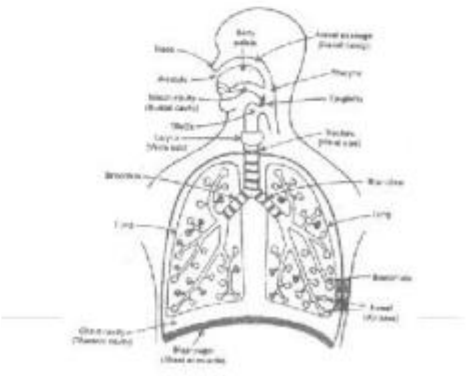


7.2 (e) Respiration in Humans :

- **Human respiratory tract**

(i) External nostrils : First part of respiratory system. It opens into nasal cavity and is meant for inhalation of air from outside.

(ii) Nasal cavity : This cavity is separated from oral cavity by means of a hard and bony palate. It is lined by ciliated columnar epithelial cells that are rich in mucus; it brings about warming,



moistening and sterilization of air. It contains hair and mucus which entrap the dust particles.

iii) Internal nares : Nasal cavity opens into it and it leads to pharynx.

(iv) Pharynx : It is a common part between both alimentary canal and respiratory system.

(v) Larynx : It is an enlarged part of trachea which is also called as **'voice box'.** It produces voice by passage of air between vocal cords. It contains four different types of cartilages among them a 'c' shaped thyroid cartilage protruding out in neck region is called Adam's apple.

(vi) Trachea : also called wind pipe. It is 10-12 cm long tube. It's walls are supported by 16 - 20 'c' shaped cartilaginous rings which percent them to collapse when air is absent in them

(vii) Bronchi : Trachea is branched into two bronchi left and right each of which enters into the lungs.

(viii) Lungs : These are two light weight spongy pouches covered by a membrane called **Pleura.** Bronchi are further branched into several bronchioles, at the end of bronchioles **alveolar sacs** or **alveoli** are present which are rich in blood capillaries and thin walled.

(vi) Diaphragm : It is a sheet of muscles that lies below the lungs and separates thoracic cavity from abdominal cavity.

• **Mechanism of breathing :** It includes

(i) Inhalation : When air is breathed in, the diaphragm and muscles attached to the ribs contract due to which there occurs expansion of chest cavity, it results increase in volume of chest cavity thus the air pressure decreases and air from outside rushes into the lungs and alveolar sacs get filled with air containing oxygen. The oxygen present in air diffuses into the blood and CO_2 from blood diffuse out into alveolar sac.

(ii) Exchange between blood and tissues : CO_2 is taken by blood and O_2 diffuses into tissues.

(iii) Exhalation : When air is breathed out the diaphragm and muscles attached to ribs relax, which brings about contraction in chest cavity, its volume gets reduced and CO_2 is pushed out from lungs into the air through trachea and nostrils.

DAILY PRACTIVE PROBLEMS # 7

OBJECTIVE QUESTIONS

1. The process of respiration is concerned with

(A) liberation of oxygen (B) liberation of carbon dioxide

(C) liberation of energy (D) intake of oxygen

2. The common immediate source of energy for cellular activity is

(A) NAD (B) ATP (C) DNA (D) RNA

3. The tissue respiration refers to

(A) inspiration (B) external respiration (C) internal respiration (D) expiration

4. If the CO_2 concentration in the blood increases, the rate of breathing will

(A) decrease (B) stop (C) increase (D) have no effect

5. Vocal cards occur in

(A) pharynx (B) glottis (C) bronchial tube (D) larynx

6. In man, which of the following structures is analogous to the spiracles of cockroach ?

(A) Alveoli (B) Lungs (C) Bronchioles (D) Nostrils

7. Which of the following prevents collapsing of trachea ?

(A) Diaphragm (B) Ribs (C) Cartilaginous ring (D) Muscles

8. Which of the following gases makes the most stable combination with the hemoglobin of red blood cells.

(A) CO_2 (B) CO (C) O_2 (D) N_2

9. Volume of air inspired or expired with each normal breath is called

(A) tidal volume (B) inspiratory capacity

(C) total lung capacity (D) residual volume

10. Most of the carbon dioxide in the blood is carried in the form of

(A) carbonic acid (B) bicarbonates

(C) carbaminohaemoglobin (D) dissolved CO_2

SUBJECTIVE QUESTIONS

SHORT ANSWER TYPE QUESTIONS

1. Define respiration. Name the different types of respiration.

2. Write three common features of respiratory organs.

3. What are the characteristics of respiratory structure present in animals ?

4. What is the function of epiglottis in man and where it is situated ?

5. How does exchange of gases takes place in the following :

(i) Roots (ii) Stem (iii) Leaves

6. Draw a labelled diagram of human respiratory system.

LONG ANSWER TYPE QUESTIONS

1. What do you mean by inhalation and exhalation ? Explain the mechanism of both in brif ?

2. List out the differences between breathing and respiration.

3. Describe the mechanism of breathing in human beings.

4. Explain the process of respiration in different parts of plant. What are the various structures involved in respiration in plants ?

5. Draw the respiratory system of human beings. What happens to the rate of breathing during vigorous exercise and why ?

6. List three differences between respiration in plants and respiration in animals. Describe with a well labelled diagram how gaseous exchange occurs through root hair in plants **[C.B.S.E., Delhi - 2005]**

7. How is respiration differs from breathing ? Explain the process of aerobic respiration and anaerobic respiration. **[C.B.S.E - 2005]**

8. Draw a diagram showing human respiratory system. Label its following parts :
   (i) Larynx (ii) Trachea (iii) Primary bronchus (iv) Lungs

9. Name the respiratory organs in the following :
   (i) A fish (ii) A bird (iii) An earthworm

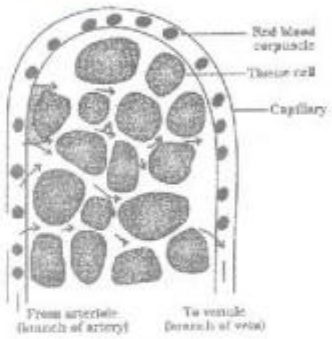
10. Draw a diagram showing how blood in the capillaries surrounding tissues exchange respiratory gases with cells of the tissues.

RESPIRATION

BL - 8

8.1 MACHANISM OF GASEOUS EXCHANGE BETWEEN TISSUES AND BLOOD :

When the air enters into the lungs through nostrils, trachea and bronchi it enters into the bronchioles, from bronchioles it moves into thin walled alveolar sacs or alveoli. Alveoli are rich in blood capillaries, at this place oxygen from air diffuses into the blood and reaches to all the cells and tissues of body this oxygen now diffuses into the cell and is utilized for the oxidation of food and production of energy in mitochondria as a result of this carbon dioxide is produced in cells, due to this increased concentration of CO_2, it diffuses into the blood and is brought back to alveoli and expelled out of the lungs through trachea and nostrils.



8.1 (a) Control of Respiration :

Respiration is controlled by the respiratory centre situated in medulla oblongata of brain.

(i) Breathing occurs involuntarily.

(ii) Under normal conditions rate of breathing is 15-18 times per minute. During vigorous exercise the demand for oxygen increases due to which rate of breathing increases by about 20-25 times.

(iii) The total area for gas exchange covered through 300 million alveoli is about 36-72 m^2 in each lung.

(iv) **Respiratory quotient :** It is defined as the ratio of the volumes of CO_2 liberated and O_2 used during respiration.

8.1 (b) Some Respiratory Disorders :

- **Emphysema :** It occurs due to infection, smoking etc. It occurs due to obstructions in bronchioles caused by breaking of alveolar septa. Bronchodilators and O_2 therapy are used, for curing this disease.
- **Asthma :** Air passages are narrowed and lead to obstruction in breathing.
- **Pneumonia :** Lymph and mucous accumulate in alveoli and bronchioles. It occurs due to bacterial and viral infection.
- **Bronchitis :** Swelling in living membranes of respiratory tract due to excessive smoking.
- **Tuberculosis :** Bacterial infection in lungs.
- **Pleurisy :** Inflammation of lung membrane called as pleurisy.
- Sudden contraction of diaphragm along with loud closure of glottis causes **Hiccough.**

• Sudden and violent expulsion of air through mouth and nose is called a **sneezing.**

• **Fermentation :** the slow decomposition of organic matter into simpler substances in the presence of enzymes is known as **fermentation. This** process is used for preparation of alcoholic beverages in presence of yeast in the absence of oxygen. Glucose and fructose are converted to ethanol by this process. It is a type of anaerobic respiration.

8.1 (c) Difference Between Aerobic and Anaerobic Respiration :

Aerobic	Anaerobic
(i) It occurs in all living cells of higher plants.	**It occurs in bacteria, certain fungi, germinatin seeds and fleshy fruits muscles.**
(ii) It requires oxygen.	**Oxygen in not required**
(iii) The end products are CO_2 and H_2O.	**The end products are alcohol or lactic acid and CO_2.**
(iv) The oxidation of one molecules of glucose produces 38 ATP molecules.	**The number of ATP molecules produced is only 2.**
(v) All the reactions except the reaction of glycolysis take place inside mitochondria.	**All the reactions take place in cytoplasm.**
(vi) Organic compounds are completely oxides and high amount of energy is realesed.	**Organic compounds are incompletely oxidized and very small amount of energy is realesed**
(vii) Non toxic to plants.	**Toxic to higher plants.**

8.1 (d) Differences Between Respiration and Photosynthesis :

Respiration	Photosynthesis
(i) It is a catabolic process.	It is an anabolic process.
(ii) Carbohydrates are oxidized.	Carbohydrates are synthesized.
(iii) Energy is liberated in the form of ATP.	Light energy is stored in the form of glucose or chemical energy.
(iv) The amount of CO_2 in the air increases during respiration.	The amount of CO_2 in the air decrease during photosynthesis.
(v) It takes place in all the living cells, both green and non-green	It takes place only in chlorophyllous cells.
(vii) Dry weight of plant decreases.	Dry weight of plant increases.
(viii) Oxidative phophorylation occurs	Photophosphorylatin occurs.
(ix) O2 is utilized and CO_2 and H_2O are formed $C_6H_{12}O_6 + 6O_2 \rightarrow 6O_2 + 6H_2O$ + energy	CO_2 and H_2O are used while O_2 is evolved. $6CO_2 + 12H_2O \rightarrow C_6H_{12}O_6 + 6O_2 + 6H_2O$.

.1 (e) Differences Between Respiration and Combustion :

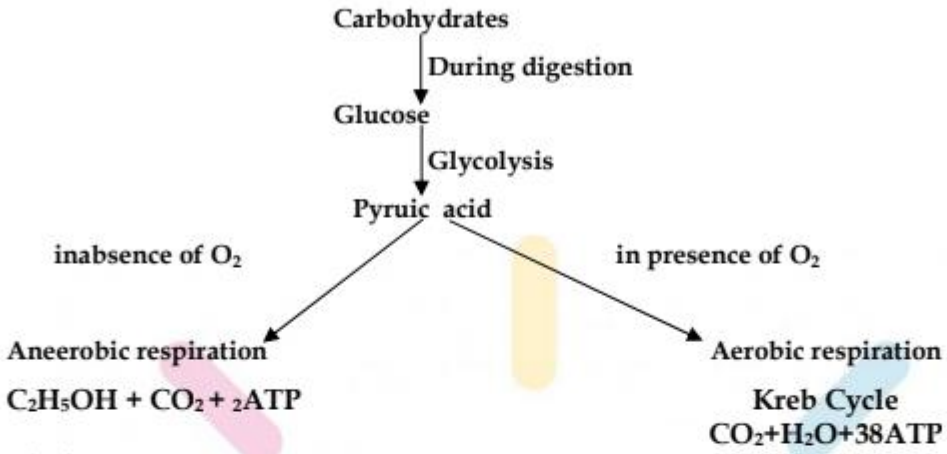
Respiration	Combustion
(i) It is a biological process	It is a chemical process.
(ii) It takes place at normal temperature.	It takes place at high temperature.
(iii) Respiration is a slow process completed I n several steps. Thus, the energy is also liberated in several steps and remains stored in the form of ATP.	Combustion is fast process in which the energy is liberated only in one step resulting in increase in temperature and production of fire.

8.1 (f) Cellular Respiration :

If refers to the oxidation of food taking place inside the cell. As this process is at cellular level so it is called cellular respiration. It takes place in three steps :

It refers to the oxidation of food taking place inside the cell. As this process is at cellular level so it is called cellular respiration. It takes place in three in 3 steps :

(i) Glycolysis (ii) Kreb Cycle (iii) Electron Transport System



8.1 (g) Glycolysis :

Glycolysis also called **EMP pathway,** site-cytoplasm of cell.

(i) In this cycle glucose is converted into pyruvic acid in presence of many enzymes and co-enzymes.

(ii) Oxygen in not required during glycolysis.

(iii) 1 molecule of glucose gives rise to 2 molecules of pyruvic acid.

(iv) In this process 4 molecules of ATP are formed among them 2ATP molecules are utilized thus net gain of ATP is two molecules.

(v) 2NADP molecules are reduced to $2NADPH_2$, which later produces 6ATP molecules.

(vi) Overall production of ATP in glycolysis is **2ATP + 6ATP = 8ATP**

(vii) There is no production of CO_2 during this process.

NOTE : After glycolysis, pyruvic acid is converted into acetyl Co-A with the release of CO_2 and the process is called as **'oxidative decarboxylation'.** It occurs in mitochondria of the cell. Besides this 6ATP are also formed during this step.

8.1 (h) Kreb Cycle :

Site : Mitochondria of cell

(i) Also called aerobic oxidation.

(ii) Discovered by **Sir Hans Kreb.**

(iii) Another name TCA cycle (tricarboxylic acid cycle) or Citric acid cycle.

(iv) It brings about the conversion of pyruvic acid, fatty acids, fats and amino acids into CO_2 and water by oxidation.

(v) It is the common path for oxidation of carbohydrates, fats, proteins.

(vi) it accounts for **24ATP** molecules.

(vii) It starts with acetyl Co-A which is then converted into several intermediate compounds with the release of **$NADPH_2$, FDH_2, ATP,** hydrogen atoms and then Acetyl Co-A is regenerated back.

8.1 (i) Electron Transport System or ETS :

(i) In this hydrogen atoms produced during oxidation of various intermediates during Kreb cycle are first broken into protons and electrons.

(ii) These protons and electrons after passing through a series of coenzymes and cytochromes combine with oxygen to form water molecules.

(iii) During these series of events 1$NADPH_2$ releases 3ATP molecules and 1$FADH_2$ gives 2ATP molecules which were produces during kreb cycle and glycolysis.

NOTE : The net gain of ATP molecules during respiration in 38ATP molecules among them,

8ATP from glycolysis

6ATP from conversion of pyruvic acid into acetyl CO. A

24ATP from kreb cycle

besides this CO_2 and H_2O are also released.

Some important points :

(i) Diaphragm becomes flat during inspiration and becomes convex during expiration.

(ii) Tidal volume : Volume of air inspired or expired in relaxed position. It is around 500 ml.

(iii) Residual volume : Air left in the whole reparatory tract after forceful expiration. It is 1.5 liters.

(iv) Total lung capacity : Maximum amount of air the lungs can hold after forceful inspiration. It is about 5-6.0 litres.

(v) Vital capacity : Maximum amount of air which can be breathed out through forceful expiration after a forceful inspiration. It is 3.4-4.8 litres.

- Vital Capacity is more in athletes, mountain dwellers, non smokers.
- The total area for gas exchange provided by our 750 million alveoli in two lungs in 100 S. m.
- In the cycle of inhalation and exhalation, repeated 15 to 18 times in a minutes about 500 ml of air is breathed in and out. In 24 hours, we breadth in 1500 litres of air.
- Blood is the medium for the transport of oxygen from the respiratory organ to the different tissues and carbon dioxide from tissues to the respiratory organs. As much as 97 percent of the oxygen is transported from the lungs to the tissues in combination with hemoglobin and only 2 percent is transported in dissolved condition by the plasma.
- A normal person has about 15 grams of hemoglobin per 100 ml of blood. One gram of hemoglobin binds about 1.34 ml of O_2. Thus, 100 ml of blood carries about 20 ml of oxygen.
- Carbon dioxide is also transported by hemoglobin. When a respiring tissue release carbon-dioxide, it is first diffused in the plasma. From here it diffuses into the red blood cells. Carbon-dioxide is transported from the tissues to the lungs in the form of bicarbonates dissolved in water.
- About 23% of carbon dioxide entering into the erythrocytes combines with the globin (protein) part of haemogloin to form carbaminohaemoglobin, which is transported to the lungs.
- Carbon monoxide binds with hemoglobin about 230 times more readily than oxygen. When a person inhales carbon monoxide, it diffuses from the alveolar air to the blood and binds to haemoglobin forming carboxyhemoglobin. The latter is a relatively stable compound and cannot bind with oxygen molecules. So, the amount of hemoglobin available for oxygen transport is reduced. The resulting deficiency of oxygen cases headache, dizziness, nausea and even death.
- **Mountain sickness :** It is also known as altitude sickness. At sea level the concentration of oxygen is about 21% and the barometric pressure averages 760 mm Hg. As altitude increases, the concentration remains the same but the number of oxygen molecules per breath is reduced. AT 12,000 feet the barometric

pressure is only 483 mm Hg, so there are roughly 40% fewer oxygen molecules per breath. In order to oxygenate the body effectively, breathing rate (even while at rest) has to be increased. This extra ventilation increases the oxygen content in the blood, but not sea level concentration. The fall in oxygenation of blood produced the symptoms of mountain sickness. These symptoms include breathlessness, headache, dizziness, nausea, vomiting, mental fatigue and a bluish tinge on the skin, nails and lips.

DAILY PRACTIVE PROBLEMS # 8

OBJECTIVE QUESTIONS

1. Breathing rate in mammals in controlled by a part of the brain called the

(A) thalamus (B) hypothalamus (C) medulla oblongata (D) cerebellum

2. In anaerobic respiration

(A) O_2 is taken in (B) CO_2 is taken in (C) O_2 is given out (D) CO_2 is given out

3. Disease called pleurisy is due to

(A) inflammation of pleura (B) inflammation of trachea

(C) inflammation of alveoli (D) none of these above

4. Leaves respire with the help of

(A) lenticles (B) stomata (C) plasmodesmata (D) cuticle

5. Correct statement is

(A) roots of plant respire through lenticles and stomata.

(B) stem of plant respire through lenticles

(C) both A and B are correct

(D) both A and B are incorrect

6. Which of the following is not a characteristic of good respiratory surface ?

(A) Thin and moist (B) Large surface area

(C) Close to oxygen and gas transport (D) Thick and dry surface

7. Respiration in yeast

(A) takes place in the presence of oxygen (B) yields lactic acid and carbon dioxide

(C) in anaerobic and produces carbon dioxide (D) takes place only in darkness

8. Muscle cells engaged in vigorous activity build up a high concentration of

(A) lactic acid (B) pyruvic acid (C) alcohol (D) cholesterol

9. Exchange of respiratory gases takes place in an earthworm through

(A) moist skin (B) gills (C) trachea (D) lungs

10. Oxygen is transported in blood mainly by

(A) leucocytes (B) erythrocytes (C) thrombocytes (D) blood plasma

SUBJECTIVE QUESTIONS

SHORT ANSWER TYPE QUESTIONS

1. Write any two points of difference between respiration in plants and respiration in animals.
2. What do you mean by fermentation ?
3. Describe the mode of respiration in an insect with a diagram.
4. What are the functions of respiratory system ?
5. Why do walls of trachea not collapse when there is less air in it ?

LONG ANSWER TYPE QUESTIONS

6. Write the differences between photosynthesis and respiration.

7. Explain the following in brief :

(a) Emphysema (b) Asthma (c) Pneumonia (d) Bronchitis

8. Describe the structure of lungs.

9. Explain in brief all the organs involved in respiratory system.

10. Explain in brief the cellular respiration.

11. Explain the process by which inhalation occurs during breathing in human beings.

12. A farmer floods his field every day thinking that watering in this manner will result in a better yield of his wheat crop. What will be the result of this action of the farmer ? **[C.B.S.E, All India 2004]**

13. What is the function of epiglottis in man ? Draw labelled diagram showing the human respiratory system. **[All India C.B.S.E. -2004]**

14. Distinguish between aerobic and anaerobic respiration in terms of end products and energy ? **[C.B.S.E. - 2004]**

ANSWERS

DAILY PRACTICE PROBLEMS # 7

Qus.	1	2	3	4	5	6	7	8	9	10
Ans.	C	B	C	C	D	D	C	B	A	B

DAILY PRACTIVE PROBLEMS # 8

Qus.	1	2	3	4	5	6	7	8	9	10
Ans.	C	D	A	B	B	D	C	A	A	B

CONTROL & CO-ORDINATION

BL - 9

9.1 INTRODUCTION :

All the living organisms show the irritability or sensitiveness. It is the property to give response to the stimulus. The stimulus can be external or internal. The living organisms adapt themselves to the external and internal factors with proper adjustment. This adjustment of the vital activities of life is called co-ordination. The working of one system is co-ordinate with that of other system **.e.g., During** eating our body performs several kinds of coordinated activities. The nose differentiates the smell of food and hand serve as the organs of ingestion. the alimentary canal and glands help in the digestion of food. Thus various organs perform co-ordinate activities.

9.1 (a) Control and Co-ordination :

Control and co-ordination also help to maintain a steady state of stability and steady state within an organism in constantly changing environment. The mechanism of maintaining internal steady state is called **homeostasis.** A mountaineer feels lack of oxygen a high altitudes In order to cope with this condition, more number of RBCs are produced. It is the internal environment (physiologically) that adjusts to the external stress i.e. lack of oxygen. Similarly mammals are capable of maintaining a constant body temperature. The vital activities of an organism are controlled by endocrine system and nervous system. There are two types of co-ordinations i.e., nervous and hormonal co-ordination. In animals both hormones and neurons (structural and functional unit of nervous system) are involved in regulating and coordinating the various vital activities. In plants only chemical (phytohormones) co-ordination is present.

9.2 CHEMICAL CO-ORDINATION IN PLANTS :

9.2 (a) Movements in Plans :

The plants are fixed in the soil so they cannot avoid various stimuli by moving away. There is no 'brain-like' structure in plants to adapt themselves according to the changes in their surroundings. Still the plants show the positive or negative responses to light, water, gravity, touch etc. The movements of plants due to stimuli are called the **tropic or curvature movements.** The response of a part of the plant to light is called **phototropism.** The stem is positively phototropic (grown towards light) while the root is negatively phototropic. The growth response of a part of plant to gravity (attraction force of the earth) is called **geotropism. The** shoot is negatively geotropic while the root is positively geotropic. **Chemotropism** is due

to the chemical stimulus **e.g. growth of pollen tube. The** Response to a stimulus, independent o direction, is called **nastic movement. The** Leaves of **Mimosa pudica** (Touch-me-not) droop own (bend) on touching.

9.2 (b) Effect of Light :

Flowering and seed germination are regulated by the duration of light, This phenomenon called **photoperiod sum**. Plants respond to this stimulus (light duration) with the help of phytochorme pigment. Phytochrome is a proteinacesous pigment and controls several light dependent developmental processes like germination, growth and flowering. Phytochrome exists in two forms Pr and Pfr . Pfr is active form and both are intervconvertible.

9.2 (c) Photoperiodism and Flowing :

It is a physiological change occurring in plants in response to relative length of the day and light. The term photoperiodism was used by **Graner and Allard** for the response of plants to photoperiods expressed in the form of flowering. On the basis of photoperiod there are three classes of plants.

(i) Shor day plants (ii) Long day plants (iii) Day neutral plants

9.2 (b) Vernalization and Flowering :

The term vernalization was coined by **Lysenko** for promotion of flowering by a previous cold treatment. For flowering in winter varieties, winter cold treatment is necessary. In nature, plant requiring cold treatment usually behaves as biennial. The germinate and grow vegetatively in first season and produce flowers during second seasons after getting the cold treatment. The suitable temperature for vernalizatin is 4^0C and time period varies from 4 days to 3 months.

Table : Difference between phototropism and photoperiodism

Phototroplsm	Photoperiodism
(i) It is a tropic movement (ii) The stimulus is perceived by apical meristem (iii) It is due to differential growth in elongation zone	(i) It is physiological response to relative lengths of day and night (ii) The stimulus is perceived by the leaves (iii) It is due to the replacement of vegetative buds by reproductive buds.

9.3 GROWTH REGULATORS :

The growth regulators are the important chemical affecting growth. Growth hormones (phytohormones) are the natural growth substances which are produced in any part of the plant and are transferred to another part and there they influence the growth of plant. The growth regulators consist of auxins , gibberellins, cytokinins, ethylene and abscisic acid. Except abscisic acid, ethylene the three are called growth hormones and ethylene, abscisic acid are growth inhibitor.

9.3 (a) Auxins :

Auxins are the growth hormones which were first discovered by Charls Darwin. Auxins are the weak organic acids which can promote elongation and growth. These are produced in the apical meristem (tips of root and stem), young leaves, flower buds and fruits. The first discovered plant hormone was identified as indole acetic acid (I.A.A.).

(i) Functions of auxins :

(A) Cell enlargement and elongation : Auxins loose the cell wall, increase membrane permeability and synthesis wall microfibirlls. All these activities result in the cell enlargement and elongation.

(B) Tissue culture

(C) Apical dormancy : The presence of terminal or apical bud involves the failure of lateral bud growth. It is due to the secretion of IAA. Removal of apical bud results in the growth of lateral buds.

(D) Root formation : Auxins can induce adventitious roots in stem cuttings.

(E) Cell division

(F) Parthenocarpy : Application of synthetic as well as natural auxins to unpollinated pistils produces parthenocarpic fruits (seedless fruits). Parthenocarpy is the phenomenon of development of seedless fruits without pollination and fertilization. This phenomenon is applies in seed bearing fruits like grape, banana, papaya, tomato etc.

(G) Curvature movements

(H) Abscission

(I) Lead and fruit fall : 2, 4 -D (2, 4- dichorophenoxy acetic acid) is applied to avoid pre-harvest fruit drop in oranges and apples.

(J) Flowering : Auxins generally inhibit flowering but in pineapple it cause flowering.

(K) Weedcides : The auxins play important role in weed control.

(L) Storage : Applied for potato storage.

9.3 (b) Gibberallins :

Gibberellins have a unique property of increasing the height of plants but they do not cause curvature. The gibberellins were firs discovered in Japan by Yabuta and Sumuki. E. Kurosawa obtained extracts from rice plants which were infected with fungus **Gibberella fujikuroi.** These rice plants were taller and sterile.

(i) Functions of gibberellins : The physiological effects of gibberellins on plant growth are as follows :

(A) Cell elongation : Gibberellins cause stem elongation and expansion of leaves in intact plants.

(B) Stem elongation : These induce stem elongation in genetically dwarf varieties (pea, maize & Cabbage) It is called bolting.

(C) Seed germination

(D) Flowering

(E) Parthenocarpy

(F) Counteract dormancy : Natural dormancy of buds, tubers, rhizomes and some seeds can be over come by gibberellins.

(G) Induction of maleness : GA_3 induces the formation of male flowers on genetically female plants in Cucurbits.

(H) Induction of aerial stem

(I) Increase in size of fruits : Application of gibberellins increase bunch length and fruit size in grapes.

9.3 (c) Cytokinins :

The cytokinins are chemically basic growth hormones which promote cell division in plants. This group of phytohormones was discovered when **Carlos Mille** isolated the crystalline substance from degraded DNA material. This substance was named as **kinetin.**

(i) Function of cytokinins : The important physiological effects of these cytokinins on plant growth are as follows :

(A) Cell division : One of the main functions of cytokinins is in cell division and more particular cytokinesis.

(B) Secondary growth : Cytokinins overcome apical dominance and promote the growth of lateral bunds.

(D) Senescence : Cytokinins can inhibit or delay senescence (ageing). Leaves treated with cytokinins, retain chlorophyll for longer period i.e., they remain green for a longer period.

(E) Morphogenesis : A natural balance between auxins and cytokinins is responsible for differentiation of stems and roots (morphogenesis). When cyntokinins are in excess, lateral buds develop while roots are formed if relatively more auxins are present.

(F) Induction of flowering

(G) Callus growth

9.3 (d) Ethylene :

This is a gaseous plant hormone which is produced by almost all the fleshy fruits during ripening. Ethylene is autocatalytic in nature. Higher concentration of auxins induce ethylene formation.

(i) Functions of ethylene : The important function of ethylene are as follows :

(A) Fruit ripening : It is used for artificial ripening of fleshy fruits in the shops.

(B) Abscission layer : Ethylene accelerates the abscission of leaves, flowers and fruits.

(C) Senescence : Ethylene induces yellowing of leaves and downward bending. This results in the senescence in the plants.

(D) Growth : It promotes transverse expansion but it inhibits longitudinal growth.

(E) Flowering : It induced flowering in pineapple.

(F) Dormancy : It breaks the dormancy of several organs of plants except lateral buds.

(G) Induction of femaleness : If has feminizing effect. This increases the number of female flowers in Cucurbits.

9.3 (e) Abscisic Acid (A.B.A.) :

Stress hormone of plants is called as abscisic acid. It is also known as dormin. **Addicott and his co-workers** isolated as substance from young cotton bolls and named it as Abscisic acid. This acid is now isolated from dormant seeds, buds and other parts of the plants. Abcisic is a growth inhibitor. Abscisic acid has no stimulating effect on any aspect of growth.

(i) Functions of abscisic acid :

(A) Growth : A.B.A. has antagonistic property to growth promoting hormones (auxins, gibberellins and cytokinins). Thus it keeps the growth under check.

(B) Dormancy : A.B.A. induces dormancy in buds towards the approach of unfavorable conditions. it causes natural dormancy in seeds and tubers.

(C) Abscission : It promotes abscission in leaves, flowers and fruits and causes ageing in plants.

(D) Wilting : During drought it closes the stomata and checks loss of water by transpiration. This ensures the survival of plant undergoes wilting.

(E) Resistance : It promotes cold hardiness.

(F) Flowering and seed development : It is known to inhibit the process of flowering, fruit formation and seed development.

9.4 CHEMICAL CO-ORDINATION IN ANIMALS :

Coordination in animals is brought about by the secretions of endocrine glands. **Endocrine glands** are ductless glands which secrete the chemical substances called hormones, Directly pour into the blood. Any chemical substance which is formed is the tissues of endocrine glands are carried by the blood the other parts of the body for its specific actions is termed as **hormone.** As organ which responds to such a hormone is known as **target organ.**

9.4 (a) Characteristics of Hormones :

(i) They are the secretions of endocrine glands.

(ii) They are produced at a place and act on target organs which are mainly away from their source.

(iii) They are poured directly into the blood steam.

(iv) They are required in very small quantities.

(v) they are specific in function.

(vi) Chemically they are mainly proteins. Some of them may be amino acids, steroids etc.

(vii) They are harmful if present in less or excess amounts.

Viii) Hormones are immediately destroyed after their action is over.

9.4 (b) Feedback Mechanism :

Endocrine glands interact with each other, so that secretion of one gland may stimulate or depress the activity of another. The amount of hormone released by an endocrine gland is determined by the body's need at any given time e.g. The hypophysis produces a hormone that stimulates the thyroid to produce its hormone; in turn the thyroid secretion induces the hypophysis to produce less thyroid stimulating its hormone; in turn the thyroid secretion induces the hypophysis to produce less thyroid stimulating

hormone. This is known as the 'negative feedback'. This feed-back helps bring about a steady state in the body which is called as **homeostasis.**

9.5 VARIOUS ENDOCRINE GLANDS PRESENT IN THE HUMAN BODY ARE :

(i)	Pituitary gland (or Hypophysis)	**(ii)**	Pineal gland	**(iii)**	Thyroid gland
(iv)	Parathyroid gland	**(v)**	Thymus gland	**(vi)**	Adrenal gland
(vii)	Pancreas	**(viii)**	Ovaries	**(ix)**	Testes

9.5 (a) Pituitary Gland (or Hypophysis):

It is a small ovoid structure attached to the base of brain (hypothalamus) by a short stalk called **infundibulum** placed just behind the optic chiasma where the optic nerve from each eye meet. Pituitary gland is also known as the **master gland** as it controls other endocrine glands. This gland consist of three lobes-anterior, middle and posterior. Each lobe of the pituitary gland secretes different sets of hormones.

(i) Hormones of anterior pituitary :

(A) Growth hormone (GH) : This hormone promotes and regulates the process of growth in the body. It's deficiency during childhood lead to **dwarfism** and over secretion leads to **gigantism.**

(B) Adrenocorticotrophic hormone (ACTH) : This regulates the activities of adrenal cortex. It mainly stimulates the adrenal cortex to secrete corticosteroid hormone which defends the human body under stress.

(C) Thyroid stimulating hormone (TSH) : As is clear from its name it controls the functioning of thyroid gland. It stimulates thyroid gland to secrete thyroxin.

(D) Follicle stimulating hormone (FSH) : It stimulates the production of gametes, stimulates the development of ovarian follicles in females, and its equivalent in the males stimulates sperm production.

(E) Luteinising hormone (LTH) : In causes ovulation and formation of corpus luteum, which secretes progesterone in females and stimulates the testis to produce testosterone in males.

(F) Luteorophic hormone (LTH) : This is also known as prolactin. This hormone stimulates growth of mammary glands during pregnancy and promotes lacation after deliver. Prolactin level rise during pregnancy and is very high during lactation.

(ii) Hormones of middle pituitary:

(A) Melanocyte stimulating hormone (MSH) : This is the only hormone secreted by middle pituitary which controls the growth and development of melanocytes responsible for skin colour.

(iii) Hormones of posterior pituitary :

(A) Vasopressin or Antidiuretic hormone (ADH): This causes the reabsorption of water into the blood from the collecting tubules of the kidney's thereby concentrating the urine and reducing it volume.

(B) Oxytocin : This hormone stimulates uterus contractions as the time of child birth and causes release of mil from mammary glands. It is also known as birth hormone or milk ejecting hormone.

9.5 (b) Pineal Gland :

It is a small gland reddish-grey in colour, about the size of a pea, attached to the roof of the third ventricle of the brain. It contributes in regulating gonadal development. It control development & concentration of melanin.

.5 (c) Thyroid Gland :

The thyroid gland consist of two lobel joined together by an isthmus. It is situated in the lower part of the neck and when enlarged it forms goitre. Two hormones secreted by the thyroid gland are :

(i) Thyroxine : It is the principal hormone secreted by the thyroid gland and its main role is to increase the metabolic rate of he organs and tissues of the whole body. 60% of thyroxine consists of iodine, an element which is essential for the gland to enable it to synthesize its hormone. The **basal metabolic rate (B.M.R.) is increased in hyperthyroidism and reduced in hypothyroidism.**

(ii) Calcitonin : This hormone lowers the calcium level in the ways :

(A) By inhibiting renal tubular calcium reabsorption.

(B) By inhibiting bone calcium reabsorption.

• **Hypothyroidism :** This results from lack or deficiency of thyroid hormone secretion. It is manifested differently in children as compared with adults. Cretinism affects children and is due to congenital defect of either absence or defect of the gland. In this disease growth is stunded, the features are coarse, frequently the child has a protruding tongue and an enlarged abdomen; the mentality of the child is low and retarded. **Myxoedema** is the condition caused by thyroid deficiency in adults. It affects woman more frequently than men. It is characterized by puffy face, thick skin, dry cough, cold and loss of hair. There is a deposition of mucin and fluid retention in extracelluar spaces. B MR **is lowered** Iodine deficiency causes **simple goitre.**

• **Hyperthyroidism** : This results from excessive secretion and over action of thyroid hormones, As excessive amount of thyrozine is poured into the blood and the metabolism of the body is speeded up. The person starts loosing weight, has an increased pulse rate, suffers from nerves excitement and there is protrusion of eye balls. These toxis sings and symptoms are responsible for the condition being known as **toxic goitre.** Other names are thyrotoxicosis, exophathalamic goiltre and grave's disease.

9.5 (d) Parathyroid Gland :

These are small ovoid pea shaped glands. They lie on the posterior surface of the thyroid gland. Usually there are two pairs of parathyroid glands, a superior pair and an inferior pair. The parathyroid secretion, **parathormone** has two main functions.

(i) It regulates the balance between the calcium in bones and in extracellular tissue fluid, thus affecting the amount of calcium in the blood.

(ii) It also controls the excretion of phosphates in the urine, probably by reducing tubular reabsorption of phosphorus by the kidney tubule.

9.5 (e) Thymus Gland :

This gland is situated in the thorax in midline under the sternum in front of trachea. It has two lobes which are further divided into many lobules. it secretes a hormone namely **thymosin.** It is one of the sites of lymphocyte formation in children. Recently thymus has assumed importance because of its role in immunological process. It helps in producing antibodies.

9.5 (f) Adrenal Glands :

These are two small semilunar structure lying one each on upper pole of the kidneys. That is why they are also known as **supra renal glands.** Each gland consists of two structurally and physiologically separate parts known as **cortex** and **medulla.** The cortex occupies outer peripheral portion which is yellowish in colour and medulla is inner brownish part. Cortex secretes three different kinds of hormones known as **corticosteroids.** They are :

(i) Mineral corticoids : These regulate sodium and potassium balance in the body.

(ii) Glucocorticoids : These derive their name from their influence on carbohydrate metabolism e.g. Glycogenesis is promoted in liver.

(iii) Sex hormones : Small quantities of sex hormones as androgens and oestrongen are produced by adrenal glands which influence sexual development and growth.

- **Adrenal medulla** is important in raising defence mechanisms and supplementing sympathetic action in the body. It secretes two hormones.

(i) Adrenaline : It is a stress hormone causes increases in systolic blood pressure, dilation of coronary blood vessels, increased sweating and increase in metabolic rate. It brings restlessness, muscle fatigue and anxiety.

(ii) Noradrenalin : It is a general vasoconstrictor, Increases both systolic and diastolic pressures. Both of these hormones are helpful in emergency conditions. Thus are called as **"fight or flight response".**

9.5 (g) Pancreas :

Pancreas is the only **heterocrine** gland in the human body. It acts as exocrine as well as endocrine gland. It acts as exocrine as it secretes pancreatic juice which is poured into the duodenum with the help of pancreatic duct. The endocrine tissue of the pancreas is in the form of clumps of secretory cells known as the **islets of langerhans.** he islet cells are of three-alpha, beta and delta.

(i) Insulin is secreted by the beta cells and like other hormones, passes directly into the blood. Insulin is required to convert glucose into glycogen **(glycogensesis)** and store it in liver. Deficiency of insulin due to defect in islets of Langerhans results in **diabetes mellitus,** a condition in which blood glucose in high and is passed in the urine.

(ii) The alpha cells of pancreas secrete **glucagon,** the metabolic effects of which are opposite to those of insulin. It causes the breakdown of liver glycogen, thereby releasing glucose into the blood stream.

(iii) The third hormone **somatostating** is secreted by the delta cells of the islets of Langerhans. It is able to inhibit the secretion of many hormones. As it inhibits the release of growth hormone of pituitary gland, it is also known as growth hormone release inhibiting hormone (GHRIH).

9.5 (h) Ovaries :

Ovaries secrete three hormone :

(i) Oestrogn : FSH from the anterior pituitary controls the secretion of oestrogen by acting on the Graffain follicles. This hormone effects the development of female sex characters. The oestrogen secretion influences the follicular phase. Its secretion in maximum during evaluation period. Moreover during pregnancy the oestrogen secretion by placenta keeps of increasing till full term.

(ii) Progesterone : It is secreted by corpus luteum. This hormone in contrast to oestrogen which is produced continuously during the reproductive years, is secreted only after ovulation. Progesterone prepares the uterus for receiving the embryo. It prepares inner lining of the uterus i.e. endometrium to receive the in implanting embryo for about a week. If ovum gets fertillized, the corpus luteum continues to play a role in maintaining the pregnancy for the first three months, after which the placenta takes over the role of corpus luteum by secreting progesterone itself. This hormone is essential for the maintenance of pregnancy and is therefore called **pregnancy hormone.** If pregnancy does not follow ovulation, corpus luteum degenerated and breaks down due to the lack of progesterone.

(iii) Relaxin : This hormone is secreted during later stage of pregnancy and leads to relaxation of muscles of the pelvic area to enable easy child birth and reduce the pressure on the foetus.

9.5 (i) Testes :

Testosterone is the main testicular hormone secreted by interstitial cells of the testis. It is mainly concerned with the development an maintenance of male sex characters and enhancing the process of spermatogenesis.

9.6 NERVOUS CO-ORDINATION IN ANIMALS :

In animals two kinds of co-ordination -nervous & chemical are present. The nervous co-ordination is brought about by the nervous system and the chemical co-ordination by hormones. Both the systems work an integrated system. Infect such a control and coordination requires.

(i) Gathering information about changes in the external environment.

(ii) Transmitting this information to the internal cells located away from the body surface and.

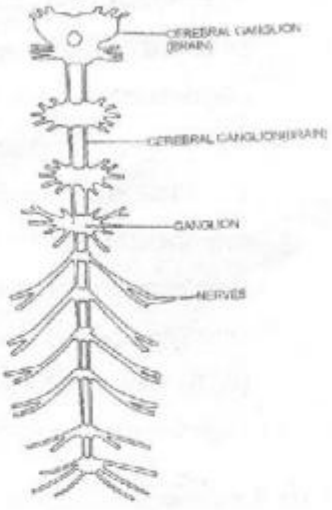
(iii) Exchange of information between the ells situated away from each other

- **Nervous system in animals :** Except, Sponges, all multicellular animals posses simple or complex nervous system. Ina all these animals, nervous system is comprised of specialized cells called neurons or nerve cells to respond to stimuli and coordinate animal activities. Nerve cells are the structural & Functional units of nervous system.

- **Nervous system of Hydra :** Hydra belongs to phylum Cridaria (Coelenterate) of the group invertebrate. The nervous system in hydra is merely a network of nerve cells joined to one another and spread throughout the body between the two gem layers, outer epidermis & inner gastrodermis. **This**

network is called as nerve net. When the body of hydra receives certain stimulus at a particular region from the environment, the nerve cells present at the region send impulses in all the direction through the network of nerve call spread throughout the body. In this way, nerve network coordinates responses to different stimuli in Hydra without the existence of central control region i.e. brain.

• **Nervous system is grasshopper (as Insect) :** In insets, the nervous system consist of a brain, ganglia (singular ganglion) & nerve cord. A mass of nerve cells is called ganglion. The nerve cord run along the entire length of the body. At interval, it has ganglia. Small nerves are given out from each ganglion. Near the anterior end of the insect body, a large bilobed ganglion, called the brain, is present. Thus the nervous system of grass hopper consist of a rain, a long nerve cord, the ganglia and nerves spreading form the nerve cord.



Nervous system of Grass hopper

DAILY PRACTIVE PROBLEMS # 9

OBJECTIVE QUESTIONS

1. Phytohormones are

(A) hormones regulating growth from seed to adulthood

(B) hormones regulating secondary growth

(C) growth regulators synthesized by plants and influencing physiological processes

(D) hormones regulating flowering.

2. The natural plant hormones were first isolated from

(A) cotton fruits, spinach leaves, rice plant (B) avena coleoptiles, fungus gibberella

(C) corn germ oil, human urine (D) human urine, rice plant.

3. If the tip of a seeding is cut off, growth as well as bending ceases because it hampers

(A) perception of light stimulus (B) transpiration

(C) respiration (D) photosynthesis.

4. A plant bends towards the source of light when exposed to the light on only one side. Which of the following is the best explanation of the phenomena ?

(A) It needs light for photosynthesis

(B) The apices of their stems are attracted by light

(C) Some auxin accumulates on the shaded side to induce greater cell elongation on that side

(D) Light stimulates the cells on the illuminated side to increase in length

5. The movement of plant organs in response to the force of gravity is called

(A) hydrotropism (B) geotropism (C) heliotropism (D) phototropism

6. A high concentration of synthetic auxins is generally used for

(A) wee control (B) enhancing root initiation

(C) controlling of cell enlargement (D) preventing the growth of the lateral buds.

7. Gibberellic acid has been successfully employed to induce flowering

(A) in long day plants under short day conditions (B) in short day plants under long day conditions

(C) for some plants (D) none of the above

8. Cytokinins are known to

(A) inhibit cytoplamic movement (C) help in retention of chlorophyll

(C) influence water movement (D) promote abscission layer formation

9. Ethylene is a

(A) solid hormone (B) gaseous enzyme (C) gaseous hormone (D) liquid gas mixture

10. Pineapple an be made to flower if off season by

(A) zeatin (B) ethylene (C) temperature (D) short days

SUBJECTIVE QUESTIONS

VERY SHORT ANSWER TYPE QUESTIONS

1. What do you mean by receptors and effectors ? Name the different types of receptors.

2. Define hormones. What do you mean by phytohomones ?

3. What do you mean by tropic and nastic movements ? Give one example of each.

4. What are the functions of nervous system ?

5. What do you mean by photoperiodism ?

LONG ANSWER TYPE QUESTIONS

6. Describe the forebrain of a mammal.

7. Write a short note a chemical co-ordination in plants.

8. Dedifferentiate between endocrine and exocrine hormones. Write the characteristics of hormones.

9. Mention the effects of sympathetic and parayasympathetic nervous system on the following :

(i) Heart (ii) Urinary bladder (iii) Eye

(iv) Gastric secretions (v) Bronchi

10. Name the different type of hormones secreted by pituitary. Also mention their functions.

11. Draw a diagram of human brain and label the following part on it :

(i) Cerebrum (ii) Meninges (iii) medulla oblongata (iv) Cerebellum

[CBSE Delhi 2005]

12. Draw a diagram of nervous system in an insect. Label the following pars on it

(i) Brain (ii) Ganglion (iii) Nerve Cord

13. Write the functions of hormone 'thyroxine' in our body. **[CBSE Delhi 2004]**

14. We suddenly withdraw our hand when a pin pricks. Name the type of response involved in this action.

[CBSE Delhi 2004]

15. Name the part of hind brain which takes part in regulation of respiration.

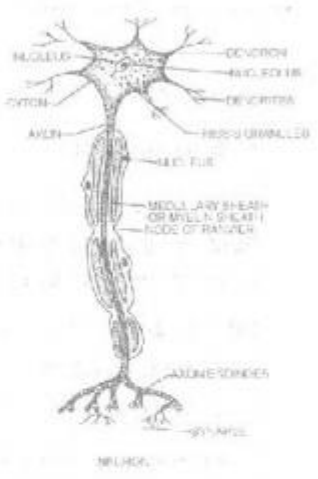
[CBSE Delhi 2004]

CONTROL & CO-ORDINATION

BL - 10

10.1 NERVOUS SYSTEM IN HUMAN :

The nervous system of human beings consists of central & peripheral nervous systems. Neuron is the structural & functional unit of nervous system. It is the longest cell found in the body. They unit the receptor and effector organs with each other. The nervous system is composed of neurons. These are surrounded by a connective tissue called neuroglia. Impulses from recptors run through neurons. The number of neurons are almost fixed for a particular species.



10.1 (a) Struture :

Each neuron consist of a cell body called cyton and a number of branches (nerve fibres) arising from the cyton. Neuron does not divide. Cyton contains a nucleus within the cytoplasm & Nissl's granules (formed of RER with ribosomes) and fine thread like fibres, called neurofibrils.

(i) Dendrites : These are short, several, much branched & contain granules. They carry impulse towards the cyton.

(ii) Axon : It is a large, single and unbranched structure. It has not nissl's granules. It carries impulses from cyton to the effector organs like glands, muscles etc. It is a typical nerve fibre consisting of a central thin cytoplasm cylindrical axis continuous with the body. It's cytoplasm is called **axoplasm.** Axis cylinder is enclosed in a thin permeable membrane called **axolemma** or nerve membrane. A layer of fatty material called myelin or medullary sheath is found outside the axolemma. Such fibres are called myelinated (medullated) fibres. They seems to be white. Nerve fibres lacking myelin sheath are called non-myelinated & appear grey in colour. Myelin in interrupted at intervals by circular constrictions called **Nodes of Ranvier.** Terminal branches of axon are called telodendria. Each telodendron ends in a swollen knob called **synaptic knob or terminal button.** Synaptic knob of one serve fibre (axon) forms synapse with the dendrites of another neuron. Synapse is a very fine gap between two neurons. Thus, in the entire nervous system neurons are linked together.

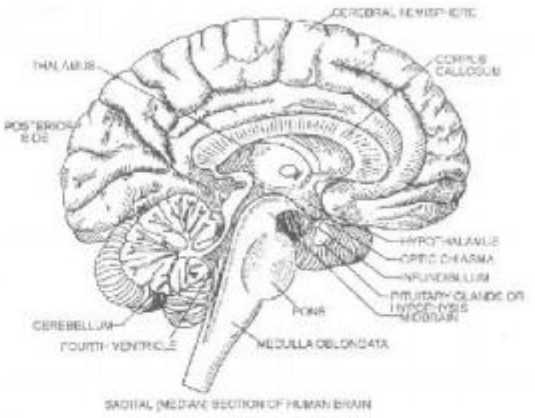
10.1 (b) Types of Neurons or Nerve Fibres :

(i) Motor : It carries impulses from brain and spinal cord to effector organs.

(ii) Sensory : It transmits impulse from sensory organs to central nervous system.

10.1 (c) Types of Nervous System :

(i) Central nervous system : It consists of the **brain** and the **spinal cord.** The brain is covered by cranium & spinal cord is covered by vertebral column Both are also surrounded by three membranes of the connective tissues called **meninges.**



- Outer most Duramater
- Middle Arachnoid
- Inner most Piamater. The space between the membrane is filled with a fluid called **cerebrospinal fluid** that protect the brain from mechanical shocks. The brain can be differentiated into three main regions fore brain, mid brain & hind brain.

(A) Fore brain : It consists of olfactory lobes, cerebrum and diencephalon.

- **Olfactory lobes :** These are a pair of small, solid, cube shaped bodies. They are fully covered by cerebrum. They receive impulse for smell.
- **Cerebrum :** It is the largest part of the brain. It consists of two cerebral hemispheres joined by a band of nerve fibres called corpus callosum. Surface of cerebral hemisphere is made up of gray metter, called cerebral cortex. It becomes highly folded to increase area for accommodation of more neurons. The folds are called gyri & depression between them, are called sulci. Deep and wide sulci are called fissures. Fissures divide each cerebral hemisphere into four lobes

(i) Occipital lobe	:	Region for visual perception
(ii) Frontal lobe	:	For muscular activities
(iii) Parietal lobe	:	For touch, smell, temperature and conscious association.
(iv) Temporal lobe	:	For auditory reception

Cerebrum has sensory areas where impulses are received from sense organs (receptors). Similarly it has a general motor area from where impulses are sent to effector organs (Muscles & glands)

- **Diencephalon :** It encloses a cavity called third ventricle. It consists of thalamus and hypothalamus. Thalamus serves as a relay centre for sensory and motor impulses from spinal cord and medullaoblongata to cerebrum. It recognizes sensory impulses of heat, cold, pain, light & pressure. Floor of third ventricle is called hypothalamus. It possesses control centres for hunger, thirst, thermoregulation, sleep, sex, stress etc.

(B) Mid Brain : It consists of two heavy fibre called **Crura cerebri.** These tracts connect fore brain to the hind brain. These are the centres for control of eye movement and hearing responses.

(C) Hind brain :

- **Cerebellum :** Very large & well developed. It controls coordination and adjustment of movements (equilibrium) and posture.
  - **Pons varolii :** it lies above the medulla oblongata. It controls some aspects of respiration.
  - **Medulla oblongata :** It is the posterior most part of the brain and continues into the spinal cord. It controls involuntary functions of the body such as heart beat, rate of breathing, secretion of saliva, swallowing, coughing, sneezing, vomiting etc.
  - **Spinal Cord :** It lies in the vertebral column. It starts from medulla oblongata and extends downward. It is also protected by three meninges and cerebrospinal fluid. It also acts as a centre for spinal reflexes.

(ii) Peripheral nervous system : It included cranial nerves and spinal nerves. It mainly controls the voluntary activities of the body. Cranial nerves also called cerebral nerves arise from brain. There are 12 pairs of cranial nerves in man and 31 pairs of spinal nerves arise from spinal cord.

(iii) Autonomic nervous system : It controls Involuntary activities of internal organs such as hear, blood vessels, glands & smooth muscles of alimentary canal & uterus. It is subdivided into

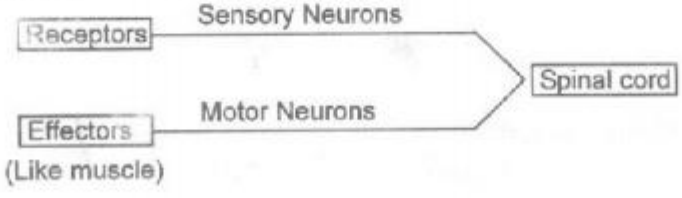
- Sympathetic
- Parasympathetic system.

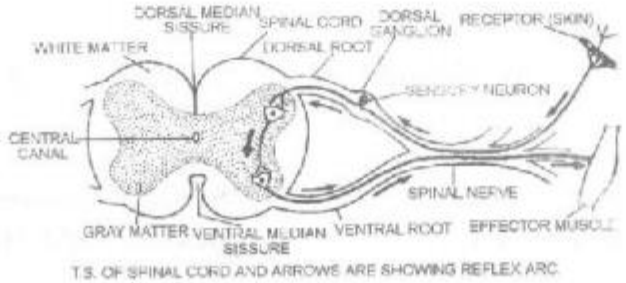
Organs receive nerves from both sympathetic and parasympathetic nerve fibres. They have opposite effects on the organs if one is stimulatory, the other is inhibitory.

10.1 (d) Effect of Sympathetic and Parasympathetic System :

Organ	Sympathetic System	Parasympathetic system
Heart	Increase heart beat	Decreases heart beat
Blood vessels	Constricts arteries & raises blood pressure.	Dilates arteries & lowers blood pressure
Brochi	Dilates bronchi making breathing easier	Constricts bronchi
Eye	Dilates pupil	Constricts pupil
Gastric secretion	Inhibits secretion	Stimulates secretion
Salivary glands	Inhibits secretion of saliva	Stimulates secretion
Urinary bladder	Relaxes urinary bladder	Contracts urinary bladder
Liver	Reduces bile secretion	Promotes bile secretion.

10.1 (e) Reflex Action :





T.S. OF SPINAL CORD AND ARROWS ARE SHOWING REFLEX ARC

Reflex action is the name given to the response which is at the level is spinal cord itself. It is a rapid automatic response to a stimulus by an organ or a system of organs, which does not involve the brain for its initiation. A reflex action is an unconscious (without will) and involuntary response of effectors (muscles or glands) to a stimulus.

10.1 (f) Reflexes are of Two Types :

Simple or unconditioned and continued reflexes.

(i) Simple reflex : It is an inborn response to a stimulus. Where learning is not required. These are mostly protective in function **e.g.** knee jerk occurred immediately when patella tendon of leg is sharply tapped, quick closing of eyelid when an object suddenly comes in fort of eyes (corneal reflex) etc.

(ii) Conditioned reflex : These are not inborn. They are acquired by experience, training & learning. **e.g. Learning of cycling or driving of scooter etc.**

10.1 (g) Electro Encephalogram (EEG) :

An instrument called electro encephalograph can record electrical activity of brain. The activity of brain is recorded as electrical potentials such a record is called Electro Encephalogram. By placing two electrodes on the scalp and leading via suitable amplifier to ink writing device, record of four different types of waves is obtained. These waves are named as alpha, beta, delta and theta and vary in frequency. These waves give the characteristic activity of brain which is very useful for clinical purposes.

DAILY PRACTICE PROBLES # 10

OBJECTIVE QUESTIONS

1. The effect of daily light period on flowering is called

(A) photooxidation (B) phototropism (C) photoperiodism (D) photorespiration

2. Brain stem is formed by the union of

(A) optic lobes (B) cerebellum with optic lobes

(C) corpora striate (D) mid brain, ponsvarolli and medulla oblongata

3. Number of spinal nerves in man are

(A) 11 pairs (B) 13 pairs (C) 6 pairs (D) 31 pairs

4. Third ventricle occurs in

(A) cerebrum (B) cerebellum (C) medulla oblongata (D) diencephalon

5. The pineal body is considered as

(A) an endocrine gland (B) an organ concerned with voluntary actions

(C) an organ concerned with vision (D) a vestige of third eye and endocrine gland

6. Part of brain involved in interpretation, storage of information and initiation of response on the basis of past experience is

(A) motor area (B) cerebellum (C) sensory area (D) association area

7. Autonomic nervous system controls

(A) reflex action (B) sense organs (C) internal organs (D) skeletal muscle

8. The study of nervous system and its disorders is called

(A) neurogenesis (B) hematology (C) neuroglia (D) neurology

9. In reflex action the reflex arc is formed by

(A) brain $\rightarrow$ spinal cord $\rightarrow$ muscles (B) receptor $\rightarrow$ spinal cord $\rightarrow$ muscles

(C) muscle $\rightarrow$ receptor $\rightarrow$ brain (D) muscles $\rightarrow$ spinal cord $\rightarrow$ receptor

10. The sensation of sight in human brain is perceived by

(A) optic lobe (B) occipital lobe (C) frontal lobe (D) parietal lobe

SUBJECTIVE QUESTIONS

VERY SHORT ANSWER TYPE QUESTIONS

1. Systematically represent the path of a reflex action. From where it is controlled ?

2. What are the functions of the following endocrine glands?
   (i) Pancreas (ii) Thyroid (iii) Adrenal (iv) Ovaries (v) Tastes

3. Name the parts of endocrine system called as super master and master, also write their functions.

4. Write a short note on electroencephalography (EEG).

5. Write a short note on forebrain ?

6. Distinguish between cerebrum & cerebellum.

7. What are the functions of hindbrain ?

LONG ANSWER TYPE QUESTIONS

8. Write a short note a nerves. Also write about the different types of nerves found in human body.
9. What is hypothalamus ? Where it is situated? What are its main functions and secretions ?
10. Describe the structure of neuron with the help of a well lablled diagram.
11. Write down the source, site of action and functions of the following.
    (i) Auxins (ii) Progesterone (iii) Thyroxin (iv) Ethylene (v) Insulin
12. Write a short note on secretory nature of.
    (i) Pancreas (ii) Liver (iii) Testes (iv) Ovaries (v) Adrenals
13. Define 'nerve impulse'. Which structure in neuron helps to conduct a nerve impulse ?
    (i) Towards the cell body (ii) Away from the cell body **[CBSE, 2004]**
14. Which hormone is responsible for the development of moustache and beard in men. **[CBSE, 2004]**
15. What is the difference between sensory and motor neurons. Which parts of human brain are responsible for auditory reception and sensation of smell ?
16. Which type of glands in human body secrete hormone ? State any one location for them. **[CBSE, 2004]**

ANSWERS

DAILY PRACTIVE PROBLESM # 9

Qus.	1	2	3	4	5	6	7	8	9	10
Ans.	C	B	A	C	B	A	A	B	C	B

DAILY PRACTIVE PROBLESM # 10

Qus.	1	2	3	4	5	6	7	8	9	10
Ans.	C	D	D	D	D	D	C	D	B	B