

What Will You Learn In This Chapter?

- Division of labour and manifestation of tissues in multicellular organisms.

6.1 Are plants and animals made of same types of tissues?

- Noticeable differences between plants and animals.
- The structural organisation of organs and organ systems.

6.2 Plant tissues

6.2.1 Meristematic tissue

- Location, characteristics, types, functions

6.2.2 Permanent tissue

- Observation of various types of cells in mounting of cross-section of a stem.

6.2.2 (i) Simple permanent tissue

- Types, location, characteristics, functions of simple permanent tissue
- Structure and function of stomata
- Deposition of chemicals like lignin, cutin, suberin and their importance.

6.2.2 (ii) Complex permanent tissue

- Structural components of xylem
- Structural components of phloem
- Structure of vascular bundle

6.3 Animal tissues

- Types of animal tissues

6.3.1 Epithelial tissue

- Squamous, cuboidal, columnar, types, arrangement, function of epithelial cells

6.3.2 Connective tissue

- Characteristics, types
- Structure of blood tissue
- Difference between bone and cartilage tissue
- Ligament and tendons
- Adipose tissue

6.3.3 Muscular tissue

- Characteristics, types
- Striated muscles, astriated (smooth) muscle and cardiac muscle

6.3.4 Nervous tissue

- Structure and function of nerve cell

INTRODUCTION

- In unicellular organisms, single cell is able to perform all the functions of body. In multicellular organisms, since there are millions of cells, they form groups based on their specialized functions.
- In multicellular organisms there is division of labour.
- A group of cells performing similar function and are similar in structure form tissues.
- They are specialized in a particular function and those are grouped together in a definite place of the body.

6.1 Are plants and animals made of same types of tissues?

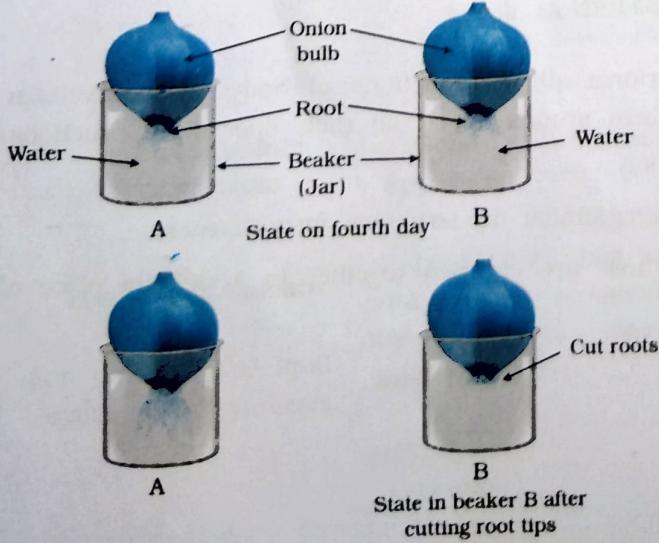
- Plant tissues and animal tissues are different.
- Plants are stationary. Plant tissues are supportive, giving mechanical and structural strength. Dead tissues provide more mechanical strength and need less maintenance. Most of the plant tissues are therefore dead tissues.
- Plants have certain tissues that divide throughout their life. These are called meristematic tissues. Some tissues are non-dividing. They are called permanent tissues.
- Animals move for different purposes and hence require more energy. Their tissues are thus living. Animals do not have dividing tissues, as their growth is not limited to certain regions only.
- Due to sedentary mode of plants the organs and organ systems are differently adapted.
- On the contrary, animals display active locomotion. Their designs of organs and organ systems are different.

6.2 Plant tissues

6.2.1 Meristematic tissue

Activity 6.1 [T.B. Pg. 69]

- Take two glass jars and fill them with water.
 → Now, take two onion bulbs and place one on each jar, as shown in fig. 6.1.



[Fig. 6.1 : Growth of roots in onion bulbs]

- Observe the growth of roots in both the bulbs for a few days.
- Measure the length of roots on day 1, 2 and 3.
- On day 4, cut the root tips of the onion bulb in jar 2 by about 1 cm. After this, observe the growth of roots in both the jars and measure their lengths each day for five more days and record the observations.
- From the above observations, answer the following questions :

- Which of the two onions has longer roots?
Why?
- Do the roots continue growing even after we have removed their tips?
- Roots of onion from jar 2 do not grow further after cutting off their tips.
- Why would the tips stop growing in jar 2 after we cut them?

Ans. When the tips of the roots are cut off, their apical meristem is lost. This tissue is responsible for growth. When it is not there, the growth halts.

- Meristematic tissue is responsible for the growth of plants. It is also known as dividing tissue. Initially they are meristematic but alter with the growth. They mature and differentiate to produce other tissues. It has dense cytoplasm and thin cellulose walls. Nuclei are prominent. Vacuoles are absent.
- It is located in the specific regions of the plants. Depending on this region meristematic tissues are subdivided into following categories :

- Apical meristem**: Present at the tips of roots and stems. Increases the length of roots and stems.
- Lateral meristem**: Present on the lateral sides. Increases girth of the stem and root. It is also known as cambium.
- Intercalary meristem**: Present at the base of the leaves or internodes on twigs.

6.2.2 Permanent tissue

- When meristematic tissue grows and takes a specific role, they lose the ability to divide and thus become permanent.

- **Differentiation :** Process of taking up a permanent shape, size and function is called differentiation.
- By differentiation of meristematic tissue, permanent tissues are formed.

Activity 6.2 [T. B. Pg. 70]

- Take a plant stem and with the help of your teacher cut into very thin slices or sections.
- Now, stain the slices with safranin. Place one neatly cut section on a slide and put a drop of glycerine.
- Cover with a cover slip and observe under a microscope. Observe the various types of cells and their arrangement.
- Now answer the following on the basis of your observation :

(1) Are all cells similar in structure ?

Ans. No. All the cells are not similar in structure. They are varied in their shape, size and structure.

(2) How many types of cells can be seen ?

Ans. About 8 to 10 different types of cells are seen in T.S. of stem.

(3) Can we think of reasons why there would be so many types of cells ?

Ans. Each type of cell performs different functions and hence there are different types of cells. Cells performing similar functions form a group. The development and growth of plant is dependent on these cells and hence there are different types of cells.

6.2.2 (i) Simple permanent tissue

- The simple permanent tissue is made-up of similar types of cells and hence they look like each other.

(1) Parenchyma :

- Unspecialized cells with thin cell walls.
- Live cells, loosely packed with large intercellular spaces between them.
- Chlorenchyma is parenchyma with chlorophyll.
- Aerenchyma is parenchyma with large air cavities within.
- Parenchyma forms basic packing tissue.
- **Functions :** (1) Support (2) Storage of food, nutrients and water. (3) Photosynthesis – in case of chlorenchyma. (4) Giving buoyancy to the plants and help in floating – in case of aerenchyma.

(2) Collenchyma :

- Living, elongated, irregularly thickened at the corners.
- Very little intercellular space.
- Located in leaf stalks below the epidermis.
- **Functions :** (1) Providing flexibility. (2) Helping in easy bending. (3) Provides mechanical support to the plant.

(3) Sclerenchyma :

- Dead cells
- Walls are thickened by lignin deposition.
- No internal space inside the cells.
- Present in stems around vascular bundle, in the veins of leaves and in hard seed coverings.
- **Function :** Providing mechanical strength to the plant.

Activity 6.3 [T. B. Pg. 72]

- Take a freshly plucked leaf of *Rhoeo*.
- Stretch and break it by applying pressure.
- While breaking it, keep it stretched gently so that some peel or skin projects out from the cut.
- Remove this peel and put it in a petri dish filled with water.
- Add a few drops of safranin.
- Wait for a couple of minutes and then transfer it onto a slide. Gently place a cover slip over it.
- Observe under microscope.

Observation :

- A peel of *Rhoeo* leaf if mounted on the slide and observed under a microscope, it reveals the structure of a leaf. The cells of epidermis and stomata are seen when observed.

Structure of a leaf :

- Outermost layer of the leaf is made-up of single layered cells called epidermis.
- Epidermis layer does not have intercellular spaces. The cells are flat, with outer and side walls thicker than the inner wall.
- Small pores, i.e., stomata are seen in the epidermal layer.
- Stomata are surrounded by pair of guard cells which are kidney-shaped.
- Stomata help in transpiration and gaseous exchange.

- Desert plants have thicker epidermis for protection. In dry habitats, water loss is the critical problem. The entire surface of the plant is therefore covered over by epidermis.
- Aerial parts of the plant are covered by epidermal cells. They secrete water-resistant, waxy layer for the purpose of protection.
- Epidermal cells also protect the plant from mechanical injury and parasitic invasion of fungi.

Questions on T.B. Page 72

- (1) Think about which gas may be required for photosynthesis.

Ans. Carbon dioxide is required for photosynthesis.

- (2) Find out the role of transpiration in plants.

Ans. Transpiration helps in getting rid of excess of water. It also creates transpiration pull, due to which ascent of sap occurs in plants. Dissolved minerals in the soil are transferred to plants by this mechanism. Only due to transpiration substances are transported to all parts, against the gravitational pull. Carbon dioxide necessary for photosynthesis is taken in through stomata.

- Epidermal cells of roots have long hair like structures to increase the area of absorption.
- Epidermis of desert plants has cutin which is thick, waxy, water-proof, protective layer that prevent the water loss.
- As the plant grows the outer epidermis is replaced by secondary meristem. The bark of tree or several layers of thick cork is formed due to growth.
- Cork cells are dead and protective. They do not have intercellular spaces and are compactly arranged. They have suberin which makes the layer impervious to gases and water.

6.2.2 (ii) Complex permanent tissue

- Complex tissues are made-up of more than one type of cells. They coordinate with each other and perform a specific function.
- Xylem and phloem are the complex permanent tissues. They together form a vascular bundle. Possessing conducting tissue is the character of the higher, terrestrial plants.

(1) Xylem : Xylem cells have thick walls and most of them are dead cells. It has following components :

- Tracheids :** Tubular structure
- Vessels :** Tubular structure
- Xylem parenchyma :** Stores food and helps in sideways conduction of water.
- Xylem fibres :** Supportive in function

(2) Phloem : Phloem transports materials in both directions. Phloem has four components :

- Sieve tubes :** Tubular cells having perforated walls
- Companion cells :** Situated on the sides of sieve tubes.
- Phloem fibres :** Dead cells in the phloem
- Phloem parenchyma**

6.3 Animal tissues

- Based on their functions, animal tissues are classified into four types, viz.
- | | |
|-----------------------|-----------------------|
| (1) Epithelial tissue | (2) Connective tissue |
| (3) Muscular tissue | (4) Nervous tissue |

6.3.1 Epithelial tissue

(1) Characteristics of epithelial tissues :

- Epithelial tissues form covering of the body.
- They are tightly packed forming a continuous sheet for the protection of organs.
- There is small amount of cementing material without any intercellular spaces.
- Extracellular fibrous basement membrane separates epithelium from the underlying tissues.
- Various epithelial cells play an important role in regulating the exchange of materials between the body and the external environments.

(2) Type of epithelial tissues : Depending on the function, epithelial tissue is subdivided.

1. Squamous epithelium : Subdivided into two subtypes, viz. simple squamous epithelium and stratified squamous epithelium.

(1) Simple squamous epithelium : extremely thin, flat and delicate cells lining various organs, e.g., Oesophagus, lining of mouth, etc.

(ii) Stratified squamous epithelium is made-up of epithelial cells arranged in many layers. It offers protection and prevents wear and tear. e.g., Skin.

2. Columnar epithelium : Tall, pillar-like cells. Facilitate movements across the epithelial barrier. e.g., Inner lining of intestine where water absorption and secretion takes place.

3. Ciliated epithelium : Columnar epithelial cells with cilia are called ciliated epithelium. Function is to push forward substances like mucus.

4. Cuboidal epithelium : Cube-shaped cells forming lining of kidney tubules and ducts of salivary glands. Function is to provide mechanical support.

5. Glandular epithelium : Portion of the epithelial tissue folds inwards and forms multicellular gland. Secretory in nature.

6.3.2 Connective tissue

- Cells are loosely packed. Intercellular matrix is present in which different types of cells are embedded. Nature of matrix differs as per the function.
- Following are the types of connective tissues : Blood, areolar connective tissue, adipose tissue, cartilage and bone, ligament, tendon, etc.

(1) Areolar connective tissue : Present between skin and muscles. Around nerves and blood vessels and also in the bone marrow.

(2) Adipose connective tissue : Below the skin and between the internal organs. The tissue is filled up with fat globules. By storing the fats it acts as an insulator.

(3) Cartilage : Cartilage has solid matrix composed of proteins and sugars. It helps to smoothen the bone ends. Also seen in nose, ear trachea and larynx. It gives the flexibility and helps in joining the two bones.

(4) Bone : Bone is a connective tissue having hard matrix made-up of calcium and phosphorus compounds. Bones make the structural framework of the body and provide the space for attachment of muscles.

(5) Ligament : Ligament is the connective tissue that joins the two bones. It has very little matrix and thus is elastic and flexible. But it is very strong.

(6) Tendon : Muscles are connected to bones by tendons. They are fibrous in nature and has limited flexibility. But it has much strength.

(7) Blood : Blood is a fluid connective tissue. In the fluid plasma, different types of blood cells are located, such as Red Blood Cells or erythrocytes, White Blood Cells or WBCs, blood platelets or thrombocytes. In the fluid plasma there are hormones, salts, proteins, respiratory gases, nitrogenous waste products, etc.

6.3.3 Muscular tissue

- Muscle fibres form muscular tissue. Special contractile proteins are present in the muscular tissue, due to which muscle is able to contract and relax.
- Muscles are of three types, viz. (1) Voluntary, striated or skeletal muscles, (2) Unstriated or involuntary or smooth muscles and (3) Cardiac muscles.
- Muscles fibres of voluntary type are long, cylindrical, unbranched, multinucleate and having dark and light striations. They are present in limbs.
- Involuntary muscles cells are long and pointed. They appear spindle-shaped. They are uninucleate and without striations. These muscles are present in iris of eyeball, in ureters, bronchi of the lungs, in alimentary canal, etc.
- Cardiac muscles are cylindrical, branched and uninucleate. They also show striations.

6.3.4 Nervous tissue

- Highly specialized cells for stimulation and transmission of stimulus form the nervous system. Brain, spinal cord and all the nerves in the body are made-up of nervous tissue. These specialized cells are called neurons or nerve cells.
- Each neuron has cyton or cell body; single, long axon and many branched dendrites.
- Nerve impulse travels through nerve fibres. Many nerve fibres together bound by connective tissue form the nerves.
- Nerves are joined with muscles and thus form combination by which locomotion is possible in all the animals.

INTEXT QUESTIONS AND ANSWERS

[T. B. Pg. 69]

(1) What is a tissue?

Ans. Group of cells having similar structure and performing similar function is called a tissue.

(2) What is the utility of tissues in multicellular organisms?

Ans. In multicellular organisms, tissues are formed by several structurally similar cells. These tissues perform specific function at a definite location in the body. Due to this ability there is division of labour among the cells of the body. The tissues then form organs and organs constitute systems. The working of the various organ systems is well co-ordinated due to tissues.

[T. B. Pg. 74]

(1) Name types of simple tissues.

Ans. The simple tissues are parenchyma, collenchyma and sclerenchyma.

(2) Where is apical meristem found?

Ans. Apical meristem is found at the growing apices of the plants such as root and stem apices / apexes or tips.

(3) Which tissue makes up the husk of coconut?

Ans. The sclerenchymatous tissue makes the husk of coconut.

(4) What are the constituents of phloem?

Ans. Phloem has four components : Sieve tubes, companion cells, phloem parenchyma, and phloem fibres.

[T. B. Pg. 78]

(1) Name the tissue responsible for movements in our body.

Ans. Muscular tissue is responsible for movements in our body.

(2) What does a neuron look like?

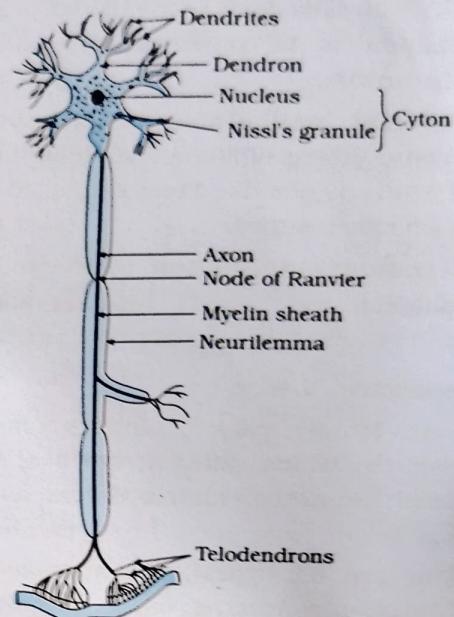
Ans. (1) Neuron has a cell body or cyton containing nucleus and cytoplasm.

(2) From neuron single long fibre-like structure arise which is called an axon.

(3) There are many short branched fibres called dendrites.

(4) Dendrites pick-up the impulse while axon transmits it further.

(5) An individual neuron may be upto a metre length.



[Fig. 6.2 : Structure of a neuron]

(3) Give three features of cardiac muscles.

Ans. (1) Cardiac muscles are cylindrical, having single nucleus or uninucleate and branched.

(2) They have dark and light bands, i.e., they are striated.

(3) They show continuous rhythmic activity which is involuntary.

(4) What are the functions of areolar tissue?

Ans. (1) Areolar connective tissue fills up the space inside the internal organs.

(2) It also supports the internal organs. It helps in the repair process of the tissue.

(3) It is present between skin and muscles.

(4) It is seen around blood vessels and nerves.

(5) It is found inside the bone marrow too.

QUESTIONS AND ANSWERS

Q. 1. Answer the following questions in very short : [1 mark each]

* (1) Define the term tissue.

Ans. Group of cells having similar structure and performing similar function is called a tissue.

* (2) How many types of elements together make up the xylem tissue ? Name them.

Ans. There are four types of elements that form xylem. They are tracheids, vessels, xylem parenchyma and xylem fibres.

(3) What is the function of vascular tissues in plants ?

Ans. Vascular tissues in plants conduct food and water from one part of the plant to another.

(4) What is the special character of cork tissue ?

Ans. Cells of the cork are dead and are compactly arranged without any intercellular spaces.

(5) Which tissue is responsible for the increase in the girth of stem ?

Ans. Lateral meristem or cambium is responsible for the increase in the girth of stem.

(6) What is differentiation ?

Ans. When tissue takes up permanent shape, size and a function, this process is called differentiation.

(7) What is the function of aerenchyma ?

Ans. Aerenchyma due to large air cavities present in them give buoyancy and help aquatic plants to float.

(8) Which permanent tissue provides flexibility to the plant ?

Ans. Collenchyma is the permanent tissue that provides flexibility to the plant.

(9) Which tissue makes the husk of the coconut ?

Ans. Sclerenchymatous tissue makes the husk of the coconut.

(10) What is special characteristic of connective tissue ?

Ans. The cells of the connective tissue are loosely spaced and embedded in an intercellular matrix.

(11) In which type of matrix are bone cells embedded ?

Ans. The bone cells are embedded in a hard matrix made-up of calcium and phosphorus salts.

(12) Which is the fibrous connective tissue having great strength but limited flexibility ?

Ans. Tendon is a fibrous connective tissue having great strength but limited flexibility.

Q. 2. Name the following : [1 mark each]

* 1. Tissue that forms the inner lining of our mouth.

Ans. Squamous epithelium

* 2. Tissue that connects muscle to bone in humans.

Ans. Tendons

* 3. Tissue that transports food in plants.

Ans. Phloem

* 4. Tissue that stores fat in our body.

Ans. Adipose connective tissue

* 5. Connective tissue with a fluid matrix.

Ans. Blood

* 6. Tissue present in the brain.

Ans. Neurons

7. Epithelial tissue containing thin, flat, irregular cells.

Ans. Squamous epithelium

8. Epithelial tissue found in the ducts of salivary glands.

Ans. Cuboidal epithelium

9. Epithelial tissue present in glands such as the thyroid and pituitary glands.

Ans. Glandular epithelium

* Q. 3. Identify the type of tissue in the following : [1 mark each]

1. Skin

Ans. Stratified squamous epithelium

2. Bark of tree

Ans. Cork which is produced by secondary meristem

3. Bone

Ans. Connective tissue

4. Lining of kidney tubules

Ans. Cuboidal epithelial tissue

5. Vascular bundle

Ans. Conducting tissue of xylem and phloem

Q. 4. Answer the following question in one word or one sentence : [1 mark each]

- (1) Which type of tissue is chlorenchyma in leaf?
- (2) Due to thickening of which substance the living cell becomes dead?
- (3) In which element of phloem, are the cells with perforated walls present?
- (4) Which tissue is living though it is irregularly thickened at the corners?
- (5) Which element of the xylem stores food and helps in the sidewise conduction of water?
- (6) Which element of the xylem is not connected with the function of conduction?
- (7) Which plant tissue allows easy bending in various parts of a plant without breaking?
- (8) What is the main function of adipose tissue?
- (9) Which epithelial tissue protects inner parts of the body and prevent wear and tear?
- (10) Which connective tissue is found between the skin and muscles?
- (11) Which epithelium tissue in the intestine is related with absorption and secretion?
- (12) Due to which component, the colour of blood is red?
- (13) Which cells are embeded in a hard matrix that is composed of calcium and phosphorus?
- (14) Which connective tissue connects muscles to bone in human being?
- (15) In which type of muscle tissue, alternate light and dark bands (striations) are not seen?
- (16) Which type of muscle tissue shows rhythmic contraction and relaxation throughout life?

Ans. (1) Parenchyma (2) Lignin (3) Sieve tube
 (4) Collenchyma (5) Xylem parenchyma
 (6) Xylem fibres (7) Collenchyma
 (8) Storage of fat (9) Squamous epithelium
 (10) Areolar connective tissue (11) Columnar epithelium (12) Red blood cells (13) Bone cells (14) Tendons (15) Unstriated muscles (16) Cardiac muscles

Q. 5. Choose the correct option from those given below each question : [1 mark each]

1. A tissue made of more than one type of cells
 A. Collenchyma B. Simple tissue
 C. Parenchyma D. Complex tissue
2. Live mechanical tissue :
 A. Parenchyma B. Collenchyma
 C. Sclerenchyma D. Chlorenchyma
3. Which tissue allows easy bending in parts of plant without breaking?
 A. Collenchyma B. Sclerenchyma
 C. Aerenchyma D. Xylem
4. What is the main function of phloem in plants?
 A. Conduction of water B. Transport of food
 C. Photosynthesis D. Ascent of sap
5. Which element of the xylem stores food?
 A. Tracheid B. Xylem fibre
 C. Xylem parenchyma D. Trachea
6. Which is the dead element of the phloem?
 A. Sieve tube B. Sieve cell
 C. Phloem parenchyma D. Phloem fibre
7. What is the location of intercalary meristem?
 A. At growing tips of stem or roots
 B. On the lateral side of plant organ
 C. Inside the trachea
 D. At the base of the leaves
8. In which tissue, large intercellular spaces are found between the cells?
 A. Meristematic B. Parenchyma
 C. Collenchyma D. Sclerenchyma
9. Which element is not included in phloem?
 A. Sieve cell B. Companion cell
 C. Collenchyma D. Phloem parenchyma
10. In which tissue is the thickening of lignin found?
 A. Collenchyma B. Sclerenchyma
 C. Phloem D. Xylem
11. Which tissue provides support to the plants?
 A. Collenchyma B. Parenchyma
 C. Sclerenchyma D. Aerenchyma

- 12.** Which tissue provides mechanical support as well as flexibility to plants ?
 A. Parenchyma B. Aerenchyma
 C. Collenchyma D. Sclerenchyma
- 13.** Which tissue provides mechanical strength along with hardness to the plants ?
 A. Parenchyma B. Aerenchyma
 C. Collenchyma D. Sclerenchyma
- 14.** Which element (component) possesses chlorophyll ?
 A. Tracheids
 B. Guard cells
 C. Phloem parenchyma
 D. Companion cell
- 15.** What is lacking in the meristematic tissue from the following ?
 A. Dense cytoplasm B. Nucleus
 C. Cellulose D. Vacuole
- 16.** Which tissue is found in leaf stalks below the epidermis ?
 A. Apical meristem B. Collenchyma
 C. Xylem D. Phloem
- 17.** Which substance does the cell wall in the husk of a coconut possess ?
 A. Lignin B. Cutin
 C. Suberin D. Pectin
- 18.** Thickening of which chemical makes the bark impervious to gases and water ?
 A. Cellulose B. Lignin
 C. Suberin D. Pectin
- 19.** Which two cells enclose the stoma (plural - stomata) ?
 A. Companion cells B. Complementary cells
 C. Guard cells D. Sclerenchyma cells
- 20.** Statement X : Both Xylem and Phloem together constitute a vascular bundle.
 Statement Y : Conducting tissues are complex permanent tissue.
 Which alternative is true for Statements X and Y ?
 A. Statement X is true, statement Y is false.
 B. Statement X is false, statement Y is true.
 C. Both the statements X and Y are true.
 D. Both the statements X and Y are false.
- 21.** Where is cuboidal epithelium located ?
 A. Lining of duct of salivary gland
 B. Lining in the respiratory tract
 C. Outer layer of skin
 D. Lining of oesophagus
- 22.** What is the characteristic of unstriated muscles ?
 A. Long, cylindrical, uninucleate
 B. Long, spindle-shaped, uninucleate
 C. Short, cylindrical, multinucleate
 D. Long, spindle-shaped, multinucleate
- 23.** Which tissue forms the lining of the intestine where absorption and secretion occur ?
 A. Squamous epithelium
 B. Stratified epithelium
 C. Columnar epithelium
 D. Ciliated epithelium
- 24.** What is invalid for areolar tissue ?
 A. Collagen fibre B. Fibroblast
 C. Macrophage D. Harversion canal
- 25.** Which are the main elements whose compounds are found in the matrix of bone cells ?
 A. Sodium and chlorine
 B. Sodium and potassium
 C. Calcium and phosphorus
 D. All the given
- 26.** Which of the following is not included in white blood corpuscles ?
 A. Neutrophil B. Lymphocyte
 C. Monocyte D. Platelet
- 27.** It is an involuntary muscle tissue possessing striations :
 A. Skeletal muscle tissue (Striated muscle tissue)
 B. Simple muscle tissue
 C. Cardiac muscle tissue
 D. Areolar connective tissue
- 28.** Which cell may be up to 1 metre long ?
 A. Nerve cell
 B. Non-striated (Unstriated)
 C. Cardiac muscle cell
 D. Collagen fibre cell
- 29.** In human, muscle cells
 A. conduct the message from one part to the another part
 B. contract and relax to cause movement
 C. conduct the food
 D. transports the oxygen

30. Bone is a tissue.

- A. epithelial
- B. muscle
- C. connective
- D. nerve

- Ans.**
- | | |
|---|----------------------|
| 1. Complex tissue | 2. Collenchyma |
| 3. Collenchyma | 4. Transport of food |
| 5. Xylem parenchyma | 6. Phloem fibre |
| 7. At the base of the leaves | |
| 8. Parenchyma | 9. Collenchyma |
| 10. Sclerenchyma | 11. Parenchyma |
| 12. Collenchyma | 13. Sclerenchyma |
| 14. Guard cells | 15. Vacuole |
| 16. Collenchyma | 17. Lignin |
| 18. Suberin | 19. Guard cells |
| 20. Both the Statements X and Y are true. | |
| 21. Lining of duct of salivary gland | |
| 22. Long, spindle-shaped, uninucleate | |
| 23. Columnar epithelium | |
| 24. Harverson canal | |
| 25. Calcium and phosphorus | |
| 26. Platelet | |
| 27. Cardiac muscle tissue | |
| 28. Nerve cell | |
| 29. contract and relax to cause movement | |
| 30. connective | |

Q. 6. Fill in the blanks : [1 mark each]

- (1) Parenchyma containing chlorophyll is called tissue.
- (2) tissue is present at shoot apex (tip of stem).
- (3) In sclerenchyma tissue, the thickening of is seen.
- (4) Aerenchyma is a type of tissue.
- (5) Sieve tube is an important element of tissue.
- (6) The only dead element of phloem tissue is
- (7) The tissue, whose cells undergo continuous cell division and produce new cells, is known as tissue.
- (8) which connects muscles to bones is a type of connective tissue.
- (9) which connects two bones to each other is a type of connective tissue.
- (10) The tissue, which is mostly attached to bones, is known a skeletal muscle tissue.

(11) All epithelium are separated from underlying tissue by an extracellular structure called

(12) A portion of the cuboidal epithelial tissue folds inward and form

(13) is a fibrous tissue with great strength but limited flexibility.

(14) cells are cylindrical, branches and uninucleate.

Ans. (1) chlorenchyma (2) Meristematic (3) lignin (4) parenchyma (5) phloem (6) phloem fibre (7) meristematic (8) Tendon (9) Ligament (10) stratified (striated) (11) basement membrane (12) multicellular gland (13) Tendon (14) Cardiac muscle

Q. 7. Fill in the blanks by selecting the correct alternative from those given in the bracket : [1 mark each]

(1) Meristematic tissue is present in of the plant. (leaf, root, root apex)

(2) tissue is not included in simple permanent tissues.

(Parenchyma, Sclerenchyma, Xylem)

(3) tissue conducts water and soluble salts along with providing mechanical strength.

(Sclerenchyma, Xylem, Phloem)

(4) In tissue, the cells become dead and without protoplasm.

(parenchyma, sclerenchyma, collenchyma)

(5) tissue stores the nutrients and water.

(Collenchyma, Parenchyma, Sclerenchyma)

(6) tissue is one of the types of parenchyma.

(Chlorenchyma, Collenchyma, Sclerenchyma)

(7) The only live component of xylem tissue is connected in the lateral transport of water.

(tracheids, trachea, xylem parenchyma)

(8) tissue is never found in the roots.

(Parenchyma, Collenchyma, Sclerenchyma)

(9) tissue forms the bark of the tree.

(Sclerenchyma, Xylem, Secondary meristem)

(10) Vascular bundle is constituted by tissues.

(meristematic, simple permanent,

complex permanent)

- (11) In cells lining lung alveoli, the transportation of substances occurs through a
 (selectively permeable surface, semi-permeable surface, solely permeable surface)
- (12) In skin, stratified epithelial tissues are arranged in many layers.
 (columnar, cuboidal, squamous)
- (13) The cells of epithelium often acquire additional specialisation as gland cell.
 (columnar, cuboidal, squamous)
- (14) Cartilage tissue is absent in the structure of (tip of nose, pinna of ear, ligament)
- (15) A striated tissue is not present in
 (stomach, heart, ureters)
- (16) The bone cells are embeded rich in salts of
 (sodium, calcium, potassium)
- (17) The intercellular material in the squamous epithelial tissue is known as
 (cementing material, jelly, secreting material)

Ans. (1) root apex (2) Xylem (3) Xylem
 (4) sclerenchyma (5) Parenchyma (6) Chlorenchyma (7) xylem parenchyma (8) Collenchyma (9) Secondary meristem (10) complex permanent (11) selectively permeable surface (12) squamous (13) cuboidal (14) ligament (15) heart (16) calcium (17) cementing material

Q. 8. State whether the following statements are true or false : [1 mark each]

- (1) The cells of meristematic tissue undergo continuous cell division and produce new cells.
- (2) Apical meristem is present at tips of stems and roots.
- (3) The inner wall of cell of collenchyma is made of lignin.
- (4) There are sclerenchyma cell in the hard covering of seeds (bean, pea and green gram).
- (5) Sclerenchyma is a dead mechanical tissue.
- (6) Parenchyma tissue is also known as chlorenchyma.
- (7) Lateral meristem (cambium) increases the girth of the root and stem.
- (8) All the cells of xylem tissue are dead cells.
- (9) All the cells of phloem are living cells.
- (10) Phloem tissue transports water and salts from roots to leaves in upward direction.

- (11) The outer layer of skin and lining of mouth is covered with squamous epithelium.
- (12) Ciliated columnar epithelium forms the lining of kidney tubules and duct of salivary glands.
- (13) Ciliated epithelium is a type of transformed columnar epithelium.
- (14) A neuron has a single axon and many dendrites.
- (15) The intercellular matrix of connective tissue may be jelly like fluid, dense or rigid.
- (16) Bones and cartilages are two types of ciliated epithelium tissue.
- (17) Blood is a connective tissue.
- (18) Cardiac muscles are cylindrical, branched and uninucleate.
- (19) Striated muscles are spindle-shaped, uninucleate, flat and narrow at ends.
- (20) Nerve impulses do not allow us to move our muscles when we want to move.

Ans. (1) True (2) True (3) False (4) True
 (5) True (6) False (7) True (8) False
 (9) False (10) False (11) True (12) False
 (13) True (14) True (15) True (16) False
 (17) True (18) True (19) False (20) False

Q. 9. Answer the following questions in short : [2 marks each]

* (1) Name the regions in which parenchyma tissue is present.

Ans. Parenchyma is present in the roots, stem and leaves. It is located in the pith of stem and roots. In leaves, they perform photosynthesis. Such parenchyma with chlorophyll is called chlorenchyma. The parenchyma with air cavities is aerenchyma which gives buoyancy to the aquatic plants.

* (2) What are the functions of the stomata ?

OR

Mention two functions of stomata.

Ans. (1) Stomata are the pores present on the epidermis of the leaves. They are enclosed on either side by guard cells. These cells regulate the opening and closing of the stomata.

(2) Stomata carry out transpiration, the process in which excess of water is thrown out of the plant.

(3) Stomata also help in gaseous exchange. The carbon dioxide required for photosynthesis is

taken from the atmosphere through stomata. The oxygen prepared during photosynthesis is given out through the stomata.

(3) Why does the growth of a plant occur in specific regions ? Where are the following found ?

(a) Intercalary meristem (b) Lateral meristem

Ans. In plants the tissues which are concerned with growth are localized only to certain regions. These tissues can divide throughout the life. Other parts of the plant may not have this tissue. This tissue is called meristematic tissue. Due to location of meristematic tissue, the growth of the plant occurs only in specific regions.

(a) **Intercalary meristem :** This type of meristem is present at the base of the leaves or at internodes.

(b) **Lateral meristem :** This type of meristem is situated on the lateral sides of the roots and stems.

* (4) What is the role of epidermis in plants ?

Ans. (1) Epidermis is the outermost layer in plants.

(2) It forms a continuous layer without any intercellular spaces.

(3) The cells of epidermis are flat with their outer and side walls thicker than the inner wall.

(4) The main function of epidermis is the protection of the underlying tissues. It also helps in absorption, secretion and transpiration.

* (5) How does the cork act as a protective tissue ?

Ans. (1) Cells of cork are dead and compactly arranged.

(2) There are no intercellular spaces.

(3) Their walls are impervious due to a chemical called suberin.

(4) Due to this character, cork becomes a perfectly protective layer that does not allow gases and water to enter or exit.

* (6) How are simple tissues different from complex tissues in plants ?

Ans. Simple tissues are made-up of single type of cells. They coordinate with each other and perform a similar function.

Complex tissues are made-up of more than one type of cells. These cells are grouped together as a one tissue. They too perform similar function.

* (7) What is the specific function of the cardiac muscle ?

Ans. (1) Cardiac muscles have cylindrical, branched and uninucleate cells.

(2) They are involuntary in nature.

(3) They have ability to undergo rhythmic contraction and relaxation.

(4) These movements cause pumping of blood throughout the life.

(8) Where are stratified squamous epithelium tissues present ? What is their function ?

Ans. Stratified squamous epithelial tissues are present in skin. They are arranged in many layers. The function of stratified squamous epithelium is to prevent the wear and tear.

Q. 10. Give scientific reasons for the following statements : [2 marks each]

(1) The meristematic tissue is chiefly connected with the function of growth in plants.

Ans. The cells of meristematic tissue divide constantly and produce new cells. These new cells are added to the plant organs, causing increase in size, shape and dry weight of the plant. The intercalary meristem causes increase in length of the internodes. The apical meristem causes increase in the length of the root and stem. Thus, the primary growth in the length of the plant is induced. The lateral meristem increases the circumference of roots and stem by causing secondary growth. Thus, the meristematic tissue is chiefly connected with the function of growth in plants.

(2) The cells of sclerenchyma and most of the components of xylem tissue are dead.

Ans. The cells of sclerenchyma as well as the components such as tracheids, tracheae and xylem fibres in the xylem tissue have their walls thickened with lignin. In these cells a secondary layer of lignin is formed on the inner side of the primary wall that is made-up of cellulose. The cytoplasm is used up and the nucleus is destroyed in the formation of lignin. Thus, the cells, without the cytoplasm and the nucleus, become dead cells.

(3) Xylem is a complex tissue.

Ans. The tissue formed of more than one types of cells is called a complex tissue. In this tissue the component cells being not divisible,

it is called a permanent complex tissue. In the plants, the tissue concerned with upward transport of water and soluble mineral salts is the xylem. The components of xylem are unicellular tracheids, multicellular tracheae (vessels) and the xylem fibres, which are all dead components with lignified walls. The xylem parenchyma are the only living cells. Thus, in the structure of xylem, there are found different dead components as well as living components. Hence, xylem is a complex tissue.

(4) Sclerenchyma tissue provides mechanical strength to the plant parts.

Ans. The cells of this tissue are dead. The walls are thickened due to lignin. Lignin is a chemical substance which acts as cement and hardens them. Thus, due to deposition of lignin sclerenchyma tissue provides mechanical strength to the plant parts.

(5) Parenchyma tissue is formed in the plants for various functions.

Ans. This tissue provides support to plants and also stores food. In some situations, it (chlorenchyma) contains chlorophyll and perform photosynthesis. It (Aerenchyma) gives buoyancy to the plants to help to float. The parenchyma of stems and roots also stores nutrient and water.

Hence, parenchyma tissue is formed in the plants for various functions.

(6) In the function of the epidermal cells of the roots and stem variety is seen.

Ans. In all parts of plant, there is a protective single-layered outermost covering of cells called epidermis.

The water-resistant cutin is absent in the epidermis of roots. There is long hair-like parts growing on the epidermis of roots. The epidermis cells of root absorb water from the ground.

There is a layer of cutin on the aerial parts like stem, which protects against loss of water, mechanical energy and invasion by parasitic fungi.

Thus, in the sclerenchyma of the epidermal cells of the roots and stem variety is seen.

(7) The bark cells of a tree are dead.

Ans. The bark cells form several layers for protective function. Secondary meristem replaces

the epidermis of the stem and form the several-layered bark. The cell wall of newly formed cells are thickened by chemical called suberin. This chemical makes the bark impervious to gases and water.

Thus, bark cells of a tree are dead.

(8) Various organs of the body are connected through the blood.

Ans. Blood is a type of liquid connective tissue. Due to heart beats, blood circulates in the body and carries various substances from one place to another place in the body. As per example, O₂ from the lungs to various cells and CO₂ from the cells to lungs, the digested food from the alimentary canal to various cells and collect the waste materials from all parts of the body and transports to liver and kidneys for excretion. Moreover salts, hormones, etc. are also transported by the blood.

Hence, various organs of the body are connected through the blood.

Q. 11. Match the following properly:

[2 marks each]

(1)	Column I	Column II
1. Apical meristem	a. Provides support	
2. Lateral meristem	b. Increase in length of root	
3. Parenchyma	c. Hardness and stiffness	
4. Sclerenchyma	d. Responsible for increase in girth of stem	

Ans. (1 - b), (2 - d), (3 - a), (4 - c).

(2)	Column I	Column II
1. Collenchyma	a. In husk of coconut	
2. Sclerenchyma	b. Helps in sideway conduction of water	
3. Xylem parenchyma	c. In leaf stalks below the epidermis	
4. Sieve tube	d. Tubular cells with perforated walls	

Ans. (1 - c), (2 - a), (3 - b), (4 - d).

Column I	Column II
1. Skeletal muscle tissue	a. Parenchyma
2. Packing tissue	b. Striated muscles tissue
3. Live mechanical tissue	c. Sclerenchyma
4. Dead tissue	d. Collenchyma

Ans. (1 – b), (2 – a), (3 – d), (4 – c).

Column I	Column II
1. Mucillaginous canal	a. Cells of the bark
2. Cuticle	b. Sclerenchyma
3. Lignin	c. Cortex
4. Suberin	d. Epidermis

Ans. (1 – c), (2 – d), (3 – b), (4 – a).

Column I	Column II
1. Gland cells	a. Columnar epithelium
2. Ciliary cells	b. Blood
3. Layered cells	c. Cuboidal epithelium
4. Suspended cells	d. Stratified epithelium

Ans. (1 – c), (2 – a), (3 – d), (4 – b).

Q. 12. Distinguish between the following : [2 or 3 marks each]

(1) Meristem tissue and Permanent tissue

Ans.

Meristem tissue
1. Meristem tissue is located only at specific regions in the plant, e.g., apical, intercalary or lateral meristem.
2. Growth of the plant is possible due to meristem.
3. Meristematic cells are very active cells.
4. There is dense cytoplasm, thin cellulose walls and prominent nuclei.
5. There are no vacuoles in the meristematic cells.

Column I	Column II
1. Repair of tissue	a. Adipose tissue
2. As an insulator	b. Areolar tissue
3. Support to main organs	c. Cartilage
4. Smoothenes the bone surface	d. Bone

Ans. (1 – b), (2 – a), (3 – d), (4 – c).

Column I	Column II
1. Guard cell	a. Areolar tissue
2. Mast cell	b. Phloem
3. Platelet	c. Stomata
4. Companion cell	d. Blood

Ans. (1 – c), (2 – a), (3 – d), (4 – b).

Permanent tissue

1. Permanent tissues such as simple and complex permanent tissues are formed from meristematic cells.
2. Permanent tissues do not bring about the growth of the plant.
3. Permanent tissues are not very active. They may be even formed by dead cells.
4. There are different types of cells that form the permanent tissues. According to the function they perform, there are changes in their structure.
5. There is a large central vacuole in cells forming permanent tissue.

(2) Parenchyma and Sclerenchyma

Ans.

Parenchyma	Sclerenchyma
<p>1. This tissue is formed of living cells.</p> <p>2. Their cell wall is thin and made-up of cellulose.</p> <p>3. Between the cells there are usually distinct intercellular spaces.</p> <p>4. In this tissue, in addition to normal parenchyma there are two special types, viz. Chlorenchyma and aerenchyma.</p> <p>5. This tissue forms ground tissue and functions as supporting tissue as well as acts as storage, photosynthetic and buoyancy giving tissue.</p> <p>6. This is a complementary tissue.</p>	<p>1. This tissue is formed of dead cells.</p> <p>2. Their primary cell wall made-up of cellulose is lined on the inner side by a thick layer (thickening) of lignin and so the cell wall is thick.</p> <p>3. Between the cells there are no intercellular spaces.</p> <p>4. In this tissue, there are two types of cells, viz. Sclerenchyma fibres and stone cells (sclerides).</p> <p>5. This tissue provides mechanical strength and rigidity to the plant organs.</p> <p>6. This is a dead mechanical tissue.</p>

(3) Collenchyma and Sclerenchyma

Ans.

Collenchyma	Sclerenchyma
<p>1. Cells of this tissue are alive.</p> <p>2. Cells show thickening of pectin.</p> <p>3. Cells show more thickening in the angular regions.</p> <p>4. This tissue renders mechanical strength as well as flexibility to the plant organs.</p> <p>5. Intercellular space is less.</p> <p>6. It is found in leaf stalks.</p>	<p>1. Cells of this tissue are dead.</p> <p>2. Cells show thickening of lignin.</p> <p>3. All the cell walls of the cell are almost uniformly thickened.</p> <p>4. This tissue renders mechanical strength and rigidity to the plant organs.</p> <p>5. No intercellular space.</p> <p>6. It is found in stem, around vascular bundles, veins of leaves and hard covering of seeds and nuts.</p>

(4) Xylem and Phloem

Ans.

Xylem	Phloem
<p>1. Xylem consists of tracheids, vessels, xylem fibres and xylem parenchyma.</p> <p>2. Three of these components are dead and only one is living. (i.e., xylem parenchyma)</p> <p>3. Xylem transports the water and minerals.</p> <p>4. The transport in xylem occurs only in one upward direction.</p> <p>5. Xylem also provides mechanical strength to the plant.</p>	<p>1. Phloem consists of sieve tubes, companion cells, phloem fibres and phloem parenchyma.</p> <p>2. Three of these components are living and one is dead. (i.e., phloem fibres)</p> <p>3. Phloem transports the synthesised food from the leaves to all the parts of the plant.</p> <p>4. The transport in the phloem occurs in both the directions.</p> <p>5. Phloem does not provide mechanical strength to the plant.</p>

(5) Bone and Cartilage

Ans.

Bone	Cartilage
<ol style="list-style-type: none"> 1. Bone is made-up of cells called osteocytes. 2. The matrix of bone contains salts of calcium and phosphorus. 3. Bones are hard and non-flexible. 4. Bones are porous. They have marrow cavity and are supplied with blood vessels. 5. Bones have Haversian canal system and canaliculi joining the adjacent osteocytes. 	<ol style="list-style-type: none"> 1. Cartilage is made-up of cells called chondrocytes. 2. The matrix of cartilage contains proteins and sugars. 3. Cartilages are not hard but are flexible. 4. Cartilages are non-porous. They do not have marrow cavity and are not supplied with blood vessels. 5. Cartilages do not have elaborate structure-like bones.

(6) Striated muscle and Smooth muscle

Ans.

Striated muscle	Smooth muscle
<ol style="list-style-type: none"> 1. It is a voluntary type of muscle. 2. Each muscle fibre possesses alternately arranged dark bands and light bands. 3. The muscle fibres are long and cylindrical. 4. The muscle fibres are multinucleate. 5. Being attached with the bones they are called skeletal muscles. 6. It is connected with the movement of limbs. 	<ol style="list-style-type: none"> 1. It is an involuntary type of muscle. 2. The muscle fibres are devoid of any such bands. 3. The muscle fibres are long and spindle-shaped, narrow at both the ends. 4. The muscle fibres are uninucleate. 5. They are called visceral muscles or simple (non-striated) muscles. 6. It is connected for the movement of food in oesophagus, circulation of blood in blood vessels.

(7) Columnar epithelium and Cuboidal epithelium

Ans.

Columnar epithelium	Cuboidal epithelium
<ol style="list-style-type: none"> 1. Columnar epithelial cells are tall and pillar-like in shape. 2. Columnar epithelial cells are concerned with absorption and secretion. 3. Location : Inner lining of intestine. 	<ol style="list-style-type: none"> 1. Cuboidal epithelium is cube-shaped cells. 2. Cuboidal epithelial cells provide mechanical support. 3. Location : Inner lining of kidney tubules.

(8) Epithelial tissue and Connective tissue

Ans.

Epithelial tissue	Connective tissue
<p>1. In the structure of this tissue, the cells are in a very large number.</p> <p>2. The cells are closely placed and are arranged closely touching each other.</p> <p>3. The intercellular substance between the cells is very slight and negligible.</p> <p>4. The cells of this tissue are arranged as fitted on the acellular basal membrane.</p>	<p>1. In the structure of this tissue, the cells are very few in number.</p> <p>2. The cells are scattered in the intercellular substance or floating in it.</p> <p>3. The intercellular substance is thick and jelly-like fluid as well as in the form of fibres.</p> <p>4. The cells of this tissue are able to divide and produce new cells.</p>

(9) Tendon and Ligament

Ans.

Tendon	Ligament
<p>1. Tendon is a connective tissue which joins muscles to the bones.</p> <p>2. Matrix of tendon is more fibrous.</p> <p>3. Great strength and limited flexibility.</p>	<p>1. Ligament is a connective tissue which joins two adjacent bones with each other forming joints.</p> <p>2. Ligaments have very less matrix.</p> <p>3. Strong with great flexibility.</p>

* (10) Parenchyma, Collenchyma and Sclerenchyma on the basis of their cell wall OR

Give three distinguishing characters of collenchyma and parenchyma.

Ans.

Parenchyma	Collenchyma	Sclerenchyma
<p>1. Parenchyma is a living tissue.</p> <p>2. Parenchyma cells are thin walled, oval, spherical or polygonal in shape.</p> <p>3. They have large intercellular spaces.</p> <p>4. Parenchyma cells do not have thickenings on their walls.</p> <p>5. Function of parenchyma is storage and support.</p> <p>Modified parenchyma :</p> <p>(a) Chlorenchyma can perform photosynthesis due to plastids present in them.</p> <p>(b) Aerenchyma gives buoyancy to the aquatic plants.</p>	<p>1. Collenchyma is a living tissue.</p> <p>2. Collenchyma cells are elongated in shape.</p> <p>3. They have very little intercellular spaces.</p> <p>4. Collenchyma cells are thickened at the corners.</p> <p>5. Gives mechanical support and flexibility to various plant parts.</p>	<p>1. Sclerenchyma is a dead tissue.</p> <p>2. The sclerenchymatous cells are polygonal in shape.</p> <p>3. They have no intercellular spaces.</p> <p>4. Sclerenchymatous cells are thickened due to lignin deposition around their walls.</p> <p>5. Makes plant parts hard and stiff. Provides strength to the plants. It is also seen in vascular bundles in which conduction is possible.</p>

* (11) Differentiate between striated, unstriated and cardiac muscles on the basis of their structure and site/location in the body. OR
 Differentiate between three types of muscular tissue.
 Ans.

Striated muscles	Unstriated muscles	Cardiac muscles
<ol style="list-style-type: none"> 1. Striated muscles are also called skeletal muscles as they are attached to skeletal parts. 2. They are voluntary in nature and act on our own will. 3. These are cylindrical, long, unbranched and multinucleate. 4. There are dark and light bands present on each muscle fibre. 5. Location : Hands, legs, face, etc. 	<ol style="list-style-type: none"> 1. Unstriated muscles are also called smooth muscles as they are associated with all the vital organs located in the body. 2. They are involuntary in nature and cannot act according to our will. 3. The cells are long with pointed ends, unbranched and uninucleate. 4. They do not have dark and light bands. 5. Location : Wall of the alimentary canal, ureter, trachea and bronchi, diaphragm. 	<ol style="list-style-type: none"> 1. Cardiac muscles are also called heart muscles as they are located in the heart wall. 2. They are involuntary in nature and show continuous rhythmic contraction and relaxation throughout the life. 3. The cells are cylindrical, branched and uninucleate. 4. They have alternate dark and light bands. 5. Location : Heart

* (12) Diagrammatically show the difference between the three types of muscle fibres.

Ans. Refer to the answer to subquestion (10) in 'Questions and Answers' section of Q. 15.

Q. 13. Answer the following questions in brief : /3 marks each]

(1) Describe the structure and functions of xylem.

Ans. (1) Xylem is a complex permanent tissue. Along with phloem it forms the vascular bundle. This conducting tissue is distinctive character of higher plants.

(2) Components of xylem are tracheids, vessels, xylem parenchyma and xylem fibres. Of these, xylem parenchyma is the only living tissue. Remaining are dead ones.

(3) Tracheids and vessels are tubular structures which transport minerals and water vertically.

(4) Xylem fibres are supporting structures.

(5) Xylem parenchyma stores food and helps in sideways conduction of water.

(6) Xylem transports water and minerals in upward direction in higher plants.

(2) Describe the structure and function of phloem.

Ans. (1) Phloem is a complex permanent tissue. Along with xylem it forms the vascular bundle. This conducting tissue is seen only in the higher evolved plants.

(2) Components of phloem are sieve tubes, companion cells, phloem parenchyma and phloem fibres.

(3) Sieve tubes are tubular structures having perforated walls. These are living cells which help in conduction of food.

(4) Phloem parenchyma and companion cells are living cells that help in the conduction process.

(5) Phloem fibres are dead cells.

(6) Phloem transports food from leaves to all other parts of the plants. The transport of substances in phloem takes place in both the directions.

(3) Describe the functions of epithelial tissues.

Ans. (1) There are different types of epithelial tissues which perform specific functions. It forms the barrier to keep different body systems separate.

(2) Exchange of materials between body and its immediate environment is done by epithelial tissues.

(3) Some epithelial cells provide mechanical support.

(4) The most important function of epithelial tissues is protection.

(5) Some carry out the function of absorption, exchange of respiratory gases, creating current by lashing cilia, excretion, etc.

(6) The glandular epithelial cells are concerned with secretion.

(4) What is a connective tissue? State its any two basic components. Differentiate between ligament and tendon.

Ans. (1) Connective tissue is a group of cells which are loosely spaced and embedded in a intercellular matrix.

(2) Two basic components of connective tissue are cells and matrix. Depending on the function of a particular connective tissue, the cells and matrix change accordingly.

(3) Difference between ligament and tendon : Refer to the answer to subquestion (9) in 'Questions and Answers' section of Q. 12.

(5) What are the different types of connective tissues ?

Ans. There are three main types of connective tissues, viz. (1) Connective tissue proper which includes areolar connective tissue and adipose connective tissue.

(2) Skeletal tissue consisting of bone, cartilage, ligament and tendon.

(3) Fluid connective tissue, i.e., blood consisting of different types of blood cells which are embedded in plasma.

(6) Describe the structure and functions of areolar connective tissue.

Ans. (1) Areolar connective tissue has different cells and fibres.

(2) Cells are fibroblast, plasma cells, macrophage and mast cell. Each cell performs definite function.

(3) There are reticular fibres and collagen fibres embedded in the matrix.

(4) Areolar connective tissue is present in the skin and muscles.

(5) The main function of areolar connective tissue is to support internal organs. They also help in the repair of the tissues.

(6) It is seen around the blood vessels and nerves and in the bone marrow.

(7) Answer the following :

1. Sketch and label adipose connective tissue

Ans. Refer to the answer to subquestion (9) in 'Questions and Answers' section of Q. 15.

2. Mention one region in the body where adipose tissue is present and state its one function.

Ans. Adipose tissue is present below the skin and also between the internal organs.

Function : Adipose tissue acts like insulator and also helps as a storage tissue.

(8) Draw a labelled diagram of striated muscle. Give its location and function.

Ans. 1. For the diagram of striated muscle : Refer to the answer to subquestion (10) in 'Questions and Answers' section of Q. 15.

2. Location of striated muscle fibre : Striated muscle fibres form voluntary and skeletal muscles. Therefore, they are found in every muscle that is attached to bones.

3. Function of striated muscle fibre : All the locomotory activities are possible due to striated muscles. They bring about all the voluntary movements of the body.

(9) Answer the following :

1. Draw a labelled diagram of neuron with two labelling.

Ans. Refer to the answer to question (2) in 'Intext Questions and Answers' section on page 34. [of T. B. Pg. 78]

2. Identify the tissue which is made-up of these cells.

Ans. Neural tissue is made from the neurons.

3. Name one organ that is made of this tissue.

Ans. Brain and spinal cord are made-up of neurons.

Q. 14. Answer the following questions in detail : (4 marks each)

(1) Why the tissues of plants and animals different from each other? Explain.

Ans. 1. **Plant tissues :** (1) Plants are fixed or stationary. Most of the plant tissues are supportive and providing structural strength.

(2) Dead cells provide more mechanical strength and hence most of the cells become secondarily dead.

(3) Plant tissues do not need maintenance.

(4) Plant tissues are of main two types, viz, meristematic or dividing and permanent tissue or non-dividing tissue.

2. Animal tissues : (1) Animals are moving and hence they require more energy.

(2) Therefore, animal tissues are living tissues.

(3) There is no distinction between dividing and non-dividing tissues.

(4) Animal tissues need continuous maintenance as they have to undergo metabolic reactions and support the life.

(2) Describe the structure of meristematic tissue and their locations in plant body.

Ans. (1) The tissue that divides throughout the life of the plant is called meristematic tissue. Because of meristematic tissue the plant can grow.

(2) The cells of meristematic tissue are very active. Their cytoplasm is dense. They have thin cellulose walls and prominent nuclei. There are no vacuoles as the tissue grows continuously.

(3) There are three types of meristems depending on their locations:

(i) Apical meristem which is present at the growing tips of roots and stems.

It increases length of the root and stem.

(ii) Lateral meristem which is present on the lateral sides of roots and stems.

It increases girth of the root and stem.

(iii) Intercalary meristem which is present at the base of the leaves and internodes.

(3) What are the different types of epithelial tissues? Describe functions of each in brief.

Ans. Epithelial tissues are the protective tissues that cover the body parts.

There are following types of epithelial tissues:

1. **Squamous epithelium :** Cells of squamous epithelium are extremely thin and flat. They are protective in nature and form the external covering of the body.

2. **Cuboidal epithelium :** The epithelial cells are cube-like and they line the delicate uriniferous tubules in kidneys. In ducts of salivary glands, they provide mechanical support.

3. **Columnar epithelium :** The tall column-like or pillar-like cells form columnar epithelium. They also carry out absorption. Seen on the inner surface of the alimentary canal.

4. **Ciliated epithelium :** The tall columnar epithelial cells whenever are provided with cilia at their free ends, this layer is called ciliated epithelium. The cilia can lash and produce current. Seen in respiratory passages.

5. **Glandular epithelium :** Glandular epithelium forms the secretory glands. It is epithelium that is folded inwards and able to secrete. Present in the various glands in the body.

6. **Stratified squamous epithelium :** Stratified squamous epithelium is the multilayered covering present on the skin.

(4) Why bone and cartilage are called connective tissues? Describe the structure of bone and cartilage.

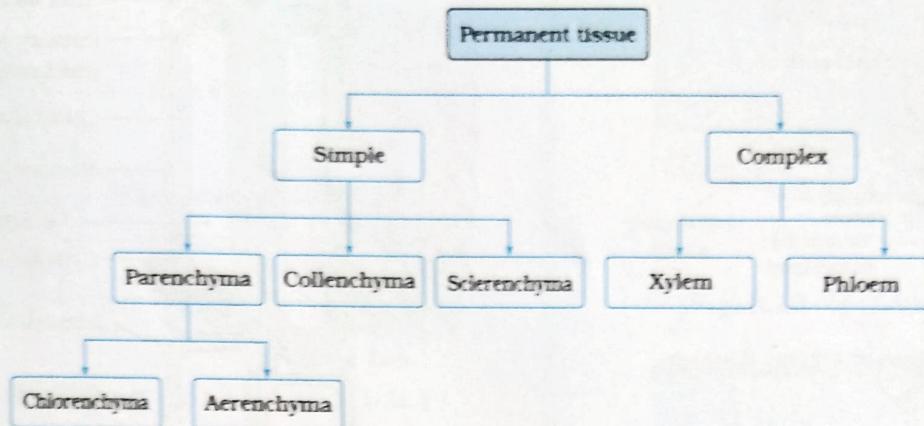
Ans. (1) Bones and cartilages are made up of cells which are embedded in a special matrix, therefore they are called connective tissues.

(2) **Structure of bone :** Bone is a strong and non-flexible tissue. Bone cells or osteocytes are embedded in hard matrix which has calcium and phosphorus compounds. Mammalian bones have Haversian canals containing blood vessels and nerve fibres. Osteocytes are present in the Haversian canals. Osteocytes have slender processes which are in contact with each other by canaliculi.

(3) **Structure of cartilage :** Cartilage is a flexible connective tissue. Its cells are called chondrocytes. They are embedded in a hyaline matrix made-up of proteins and sugars.

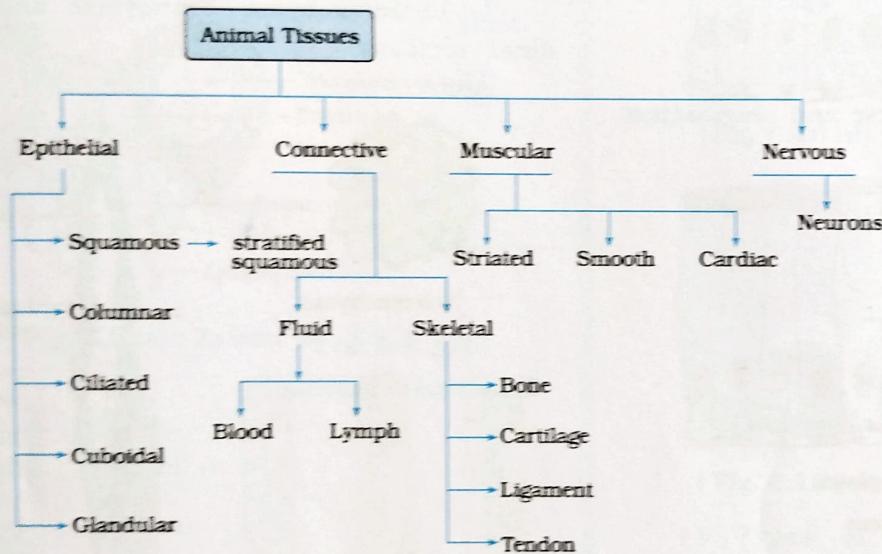
* (5) Complete the table:

Ans.



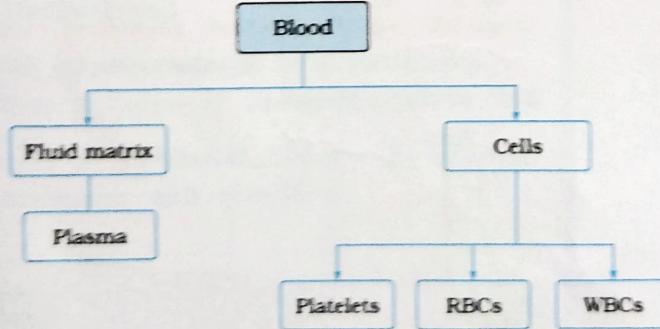
(6) Make a chart to show all the animal tissues.

Ans.



(7) Mention the different components of blood in the following diagram:

Ans.



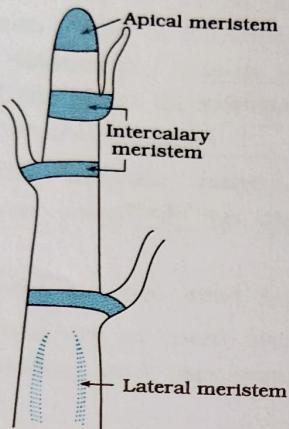
(8) Write a brief account of structure of neuron.

Ans. (1) Cells of nervous system are called neuron. It is highly specialised for conduction of nerve impulse. (2) Neurons are able to respond and transmit the nerve impulse upon stimulations. (3) Each neuron consists of a cell body or cyton. It has prominent nucleus and cytoplasm. (4) There are

two kinds of filaments arising from the cyton. There is single axon and many dendrites. (5) Dendrites pick-up the information about impulse and convey it to cyton. (6) Cyton analyses this information and conducts the impulse further through axon. (7) Axon relays it to the dendrites of the next neuron. (8) Brain, spinal cord and all the nerves in the body are made-up of millions of neurons.

Q. 15. Draw the labelled diagram:
(1) Location of meristematic tissue in plant body

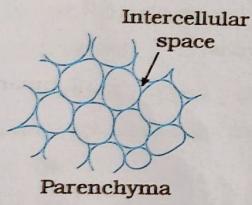
Ans.



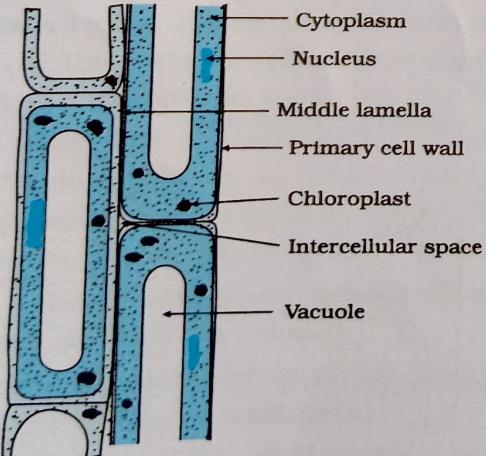
[Fig. 6.3]

(2) Parenchyma – Transverse and longitudinal sections

Ans.



[Fig. 6.4 (a) : Transverse section]



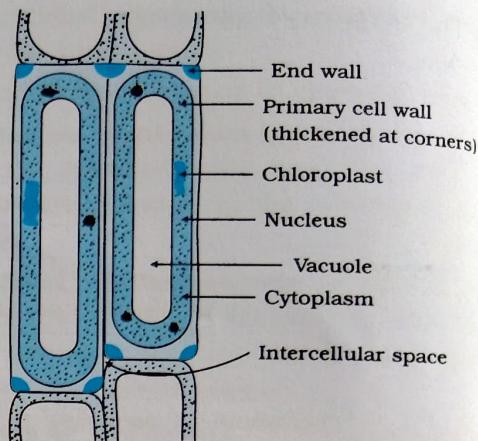
[Fig. 6.4 (b) : Longitudinal section]

(3) Collenchyma – Transverse and longitudinal sections

Ans.



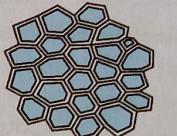
[Fig. 6.5 (a) : Transverse section]



[Fig. 6.5 (b) : Longitudinal section]

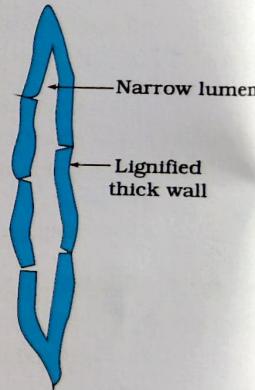
(4) Sclerenchyma – Transverse and longitudinal sections

Ans.



Sclerenchyma

[Fig. 6.6 (a) : Transverse section]

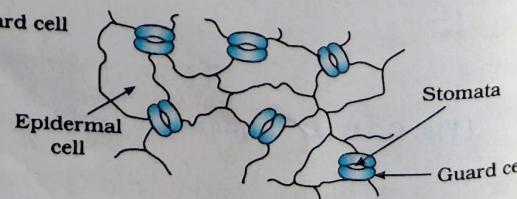
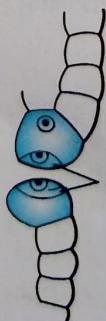


[Fig. 6.6 (b) :

Longitudinal section]

(5) Structure of stomata in lateral view and surface view

Ans.



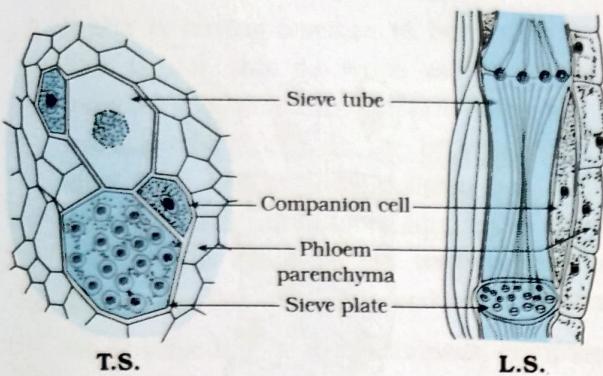
(a)

(b)

[Fig. 6.7 : (a) lateral view (b) surface view]

(6) Section of phloem

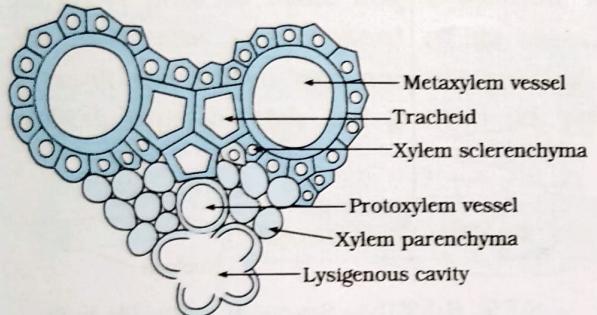
Ans.



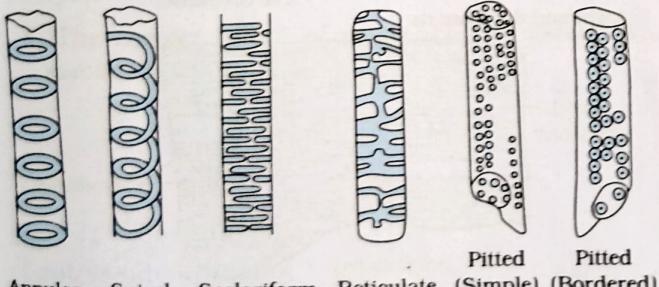
[Fig. 6.8 : Phloem in T.S. and L.S.]

(7) Elements of xylem

Ans.



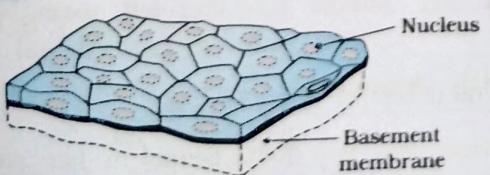
[Fig. 6.9 (a) : Xylem in T.S.]



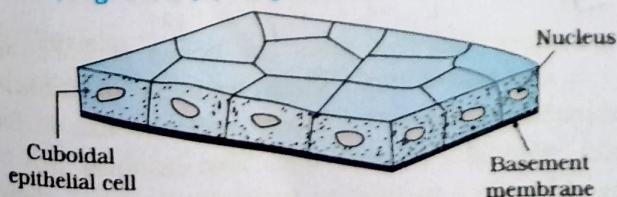
[Fig. 6.9 (b) : Xylem vessel in L.S. showing different types of thickenings]

(8) Types of epithelial tissues - Squamous, cuboidal, columnar and stratified

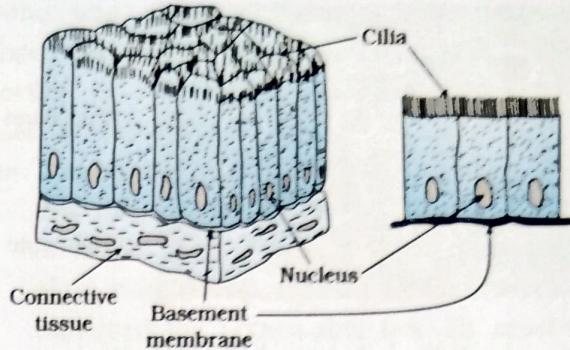
Ans.



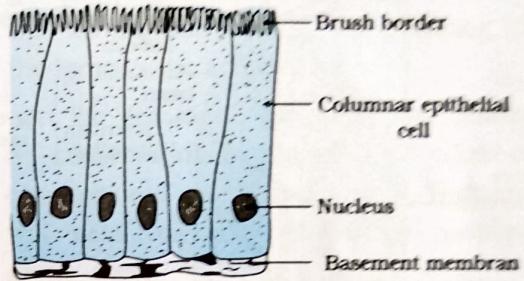
[Fig. 6.10 (a) : Squamous epithelium]



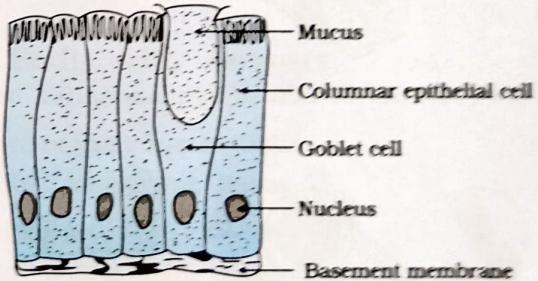
[Fig. 6.10 (b) : Cuboidal epithelium]



[Fig. 6.10 (c) : Ciliated epithelium]



[Fig. 6.10 (d) : Columnar epithelium]



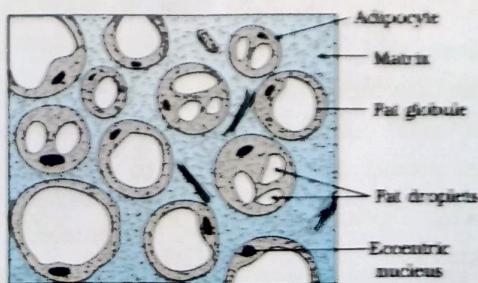
[Fig. 6.10 (e) : Glandular epithelium]

(9) Types of connective tissues - Areolar, adipose, cartilage, bone and blood cells

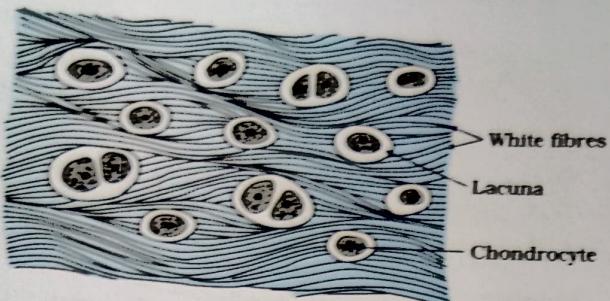
Ans.



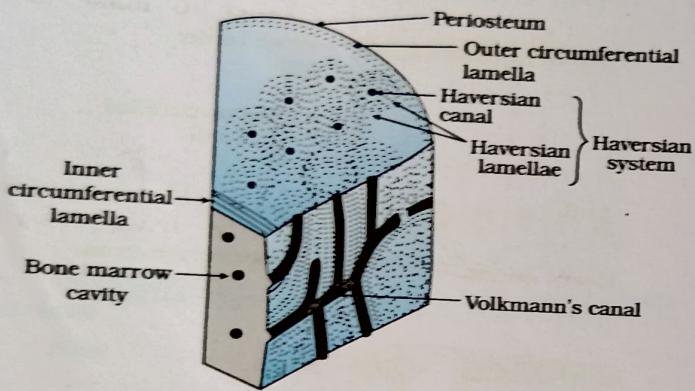
[Fig. 6.11 (a) : Areolar connective tissue]



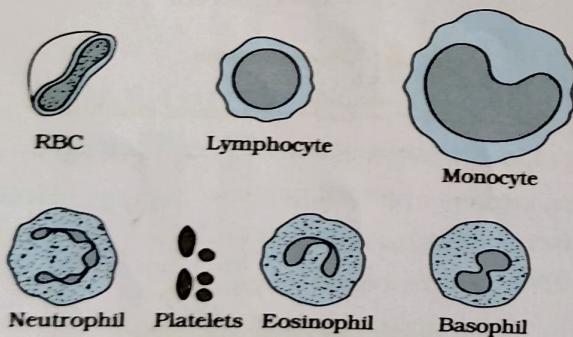
[Fig. 6.11 (b) : Adipose connective tissue]



[Fig. 6.11 (c) : Fibrous cartilage]



[Fig. 6.11 (d) : 3D Structure of mammalian bone]



[Fig. 6.11 (e) : Types of blood cells]

* (11) Neuron

Draw a labelled diagram of a neuron.

Ans. Refer to the answer to question (2) in 'Intext Questions and Answers' section on page 34.
(of T. B. Pg. 78)**Value Based Questions with Answers**

1. Smita had an accident and broke her knee ligament and fractured her forearm. Doctor set the fracture but advised her a surgery for knees and complete rest for 4 weeks. She cannot attend the school due to doctor's advice.
- (1) Why Doctor has to perform surgery on knees ?
- (2) What is ligament ?

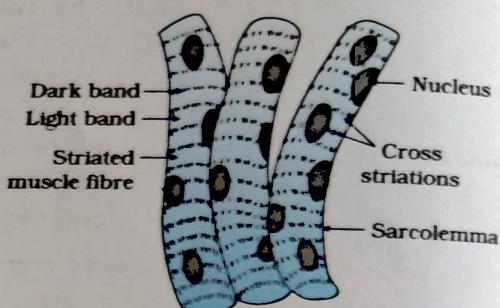
- (3) How will you help Smita in her studies ?
What value is seen when you are helping her ?

Ans.

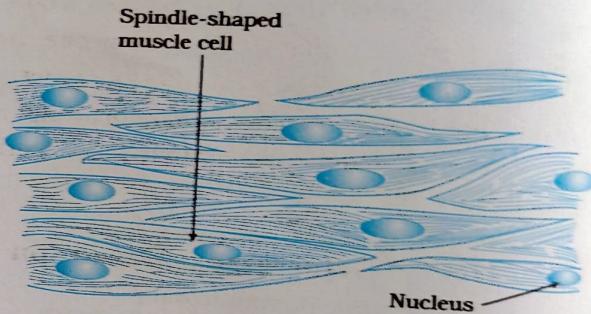
- (1) Knee ligament joins the bones of knee-cap and lower leg. When ligament is broken, Smita is not able to walk, bend, sit or stand for a long time. This ligament has to be fixed in time to make Smita again stand on her feet. Therefore, surgery is a must.

(10) Types of muscular tissue - Striated, smooth and cardiac muscles

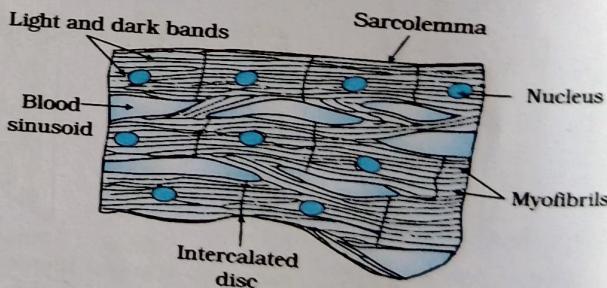
Ans.



[Fig. 6.12 (a) : Striated muscle fibre]



[Fig. 6.12 (b) : Smooth muscles]



[Fig. 6.12 (c) : Cardiac muscles fibre]

- (2) Ligament is the connective tissue that joins two bones.
- (3) Smita is having fracture in her forearm too. She is not able to write as the voluntary muscles connected to the arm bone will not work properly due to the broken bone. We shall help her in writing down her studies. She can read out lesson, study the answers and dictate these to us, we can act as a writer for her till she recovers completely. We observe the value of kindness, compassion when we help her. We care for her and share her work as she is pain.
2. Mahesh had planted a mango tree. As soon as its shoot grew to some height, someone from the road came and chopped off its shoot. As a result the mango tree was not growing tall. Mahesh kept a watch and grabbed the person

who was plucking the tip. What must have been explained by Mahesh to this man in order to save his tree? What values do you see in Mahesh?

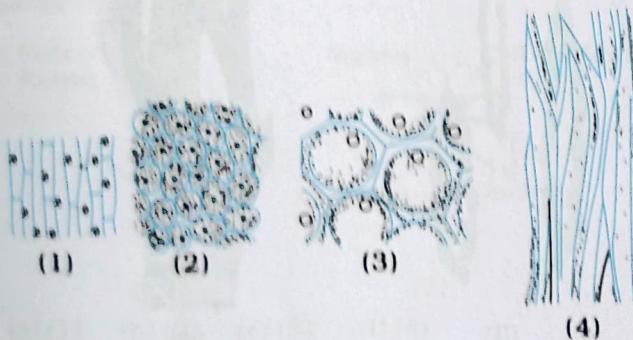
Ans. The tip of plant has apical meristem. Due to this tissue, the growth of plant takes place in height. When this part was removed, the plant was getting stunted. Mahesh must have explained the person this fact. He must have also explained the man about how this apical growth is necessary in order to make the tree strong and healthy. By plucking the tip, the growth is arrested.

We see value of caring for nature and its conservation in Mahesh. He takes care of planting and growing the tree. This certainly will help the environment by having more green cover.

Questions Based on Practical Skills with Answers

Q. 1. Select the appropriate option and complete the sentence:

1. The correct figure of sclerenchyma tissue is ...



- (a) (1) (b) (2) (c) (3) (d) (4)

2. Raj observed nerve cells under the microscope and made the following sketch. The mistake in his drawing is cyton with ...

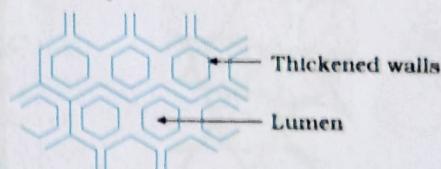


- (a) cilia (b) dendrites
(c) nucleus (d) cytoplasm

3. A slide given to you for identification consists of long narrow dead cells which have thick boundaries. Under which tissue would you place them?

- (a) Sclerenchyma tissue
(b) Collenchyma tissue
(c) Parenchyma tissue
(d) Meristematic tissue

4. A student observed the empty spaces in slide of sclerenchyma. It shows ...



- (a) Protoplasm is dead at maturity
(b) Intercellular spaces
(c) Cytoplasm is thin
(d) Lumen in cell

5. The characteristic features to identify a nerve cell are :

- (a) Round or oval cells with bilobed nucleus and cytoplasmic granules.
(b) Cell body with branched cytoplasmic extensions at one end and a long projection at the other end.
(c) Spindle-shaped cell with a big central nucleus.
(d) Red coloured, biconcave disc-shaped enucleated cells.