CHAPTER – 2

TISSUES – THE BUILDING BLOCKS OF LIFE

P. 28 Check Your Progress 1

A. Name the following.

1. Apical, intercalary and lateral meristem
2. Sieve tube and companion cell
3. Apical meristem
4. Phloem fibres

B. Tissues are a group of similar cells performing the same function and having a common origin.

Different types of plant tissues are

i. Meristematic tissue

ii. Permanent tissue

C. State if the following statements are true or false.

1. True 2. True 3. False 4. True

D. Which of the following pairs are correctly matched? Tick them.

3 and 5

P. 35 Check Your Progress 2

A. Name the following.

1. Tendon
2. Squamous epithelium

B. Answer these questions.

1. Striated muscles – limbs.

   Unstriated muscles – alimentary canal.

2. Functions of connective tissue –

   i. It binds one organ to another, e.g., muscles with skin, muscles with bones.

   ii. It forms a supporting framework of cartilage and bones in the body.

C. State whether the following statements are True (T) or False (F).

1. T 2. T 3. T

P. 36 Exercises

I. Multiple-Choice Questions

A. Choose the most appropriate answer.

1. a 2. b 3. b 4. b 5. d
6. a 7. c 8. b 9. b 10. b

II. Assertion–Reason Type Questions

A. 1. c 2. c 3. c 4. a

III. Very Short Answer Type Questions

A. Name the following.

1. Tissue
2. Xylem
3. Phloem
4. Meristematic (in plants) epithelial (in animals)
5. Adipose
6. Muscular tissues
7. Ligament

B. Complete the following paragraph by filling in the blanks (1) to (5) with appropriate words.

1. meristematic
2. Parenchyma
3. collenchyma
4. Xylem
5. phloem

C. Match the items in Column A with those in Column B and write down the matching pairs.

1. c 2. b 3. d 4. a
5. e

D. Give the location of the following tissues in our body.

1. **Ciliated epithelium:** urinary tubules, oviducts, bronchioles
2. **Tendon:** between bones and muscles in arms, legs, hand, feet, head, torso
3. **Stratified epithelium:** skin, cornea
4. **Striated muscles:** limbs, tongue, body wall, pharynx
5. **Cartilage:** larynx, trachea, at the end of bones and nasal septum
6. **Meristematic tissue:** apices of stem, roots and their branches, in the growing young leaves and tip of axillary buds, sides of roots and stems, bases of leaves, above or below the nodes
7. **Ligament:** between bones (joints)
8. **Columnar epithelium:** stomach, intestine, gall bladder.

E. Note the relationship between the first two words and suggest a suitable word/words for the blanks.

1. Sclerenchyma
2. Food
3. Chondrocytes
4. Yellow fibre
5. Ligaments

F. Answer these questions.

1. Parenchyma is found in all softer parts of plants like epidermis, cortex, pith of roots and stem and leaf mesophyll. It is also found in xylem and phloem.
2. Bone and cartilage are supportive connective tissues that form supporting framework in our body.
3. Cardiac muscles are exclusively present in the heart. These muscles are involuntary and work rhythmically tirelessly, contracting and relaxing endlessly from early embryonic stage until death.
4. Nervous tissue
5. Meristematic cells are living cells, compactly packed without intercellular spaces. The vacuoles are almost absent.
6. Skeletal or striated muscles are attached to bones. Their movement is under animals will. These muscles help us to do all the basic and complex movements everyday like walking, picking up things, jumping, talking, etc.
7. Smooth muscles are also called non-striated muscle because they lack transverse striations or bands.

IV. Short Answer Type Questions

A. Write down two main differences between the following.

1.

Cell	Tissue
Cell is the structural and functional unit of life.	Tissue is a group of cells that are similar in structure and origin.
Cell is microscopic in nature.	Tissue is much larger as it comprises a number of cells.

2.

Meristematic tissue	Permanent tissue
These are group of actively-dividing cells.	These are group of cells which have lost their ability to divide.
These are living, compactly arranged cells with dense cytoplasm, prominent nucleus and thin cell wall.	These may be living or dead cell which are fully differentiated and have conspicuous intercellular spaces.

3.

Parenchyma	Collenchyma
Cell wall is commonly thin walled without any thickening at the corners.	Cell wall have cellulose thickenings at the corners.
It stores food material.	It mainly provides mechanical support in the organ in which it is present.

4.

Collenchyma	Sclerenchyma
Made up of living cells.	Made up of dead cells.
Thickening in the wall is non-uniform due to deposition of cellulose at the corners.	Wall thickening is uniform due to uniform deposition of lignin.

5.

Xylem	Phloem
It conducts water and minerals from roots to different parts of the plant.	It transports food in soluble form from leaves to different parts of the plants.
Transport through xylem is always unidirectional.	Transport through phloem is bidirectional.

6.

Cuboidal epithelia	Columnar epithelia
Cells are square-shaped or cuboidal with centric and rounded nuclei.	Cells are columnar or pillar-like with oval shaped nuclei.
Found in glands and nephrons.	Found in inner lining of stomach and intestine, etc.

7.

Cartilage	Bone
Cartilage is soft, compact, non-porous and elastic skeletal connective tissue.	Bone is rigid and hard porous connective tissue.
It has no nerves and blood vessels.	It has good supply of blood vessels and nerves.

8.

Striated muscles	Unstriated muscles
These are cylindrical, unbranched multinucleated fibres having alternate dark and light bands.	These are spindle shaped, uninucleate fibres which lack light and dark bands.
Present in limbs, body walls, tongue, pharynx, etc.	These are present in oesophagus, urino-genital tract, urinary bladder, vessels, iris, etc.

9.

Simple tissue	Complex tissue
These tissues are made up of only one type of cells.	These tissues are made up of more than one type of cells.
The cells are similar in structure and perform similar functions.	Different type of cells perform different functions.

B. Answer these questions.

1. Two functions of sclerenchyma:

(i) It provides mechanical strength to the plant parts.

(ii) It protects the plant from environmental forces like strong winds.

2.

Sclerenchyma	Parenchyma
Sclerenchyma cells are generally dead.	It is made up of living cells.
Cell wall is uniformly thickened due to deposition of lignin.	Cell wall is thin made up of cellulose.
They provide mechanical support.	Their main function is storage and photosynthesis.
Cells are compactly packed without intercellular spaces.	Cells are losely packed with intercellular spaces.

3. Protective tissues are usually present in the outermost layer of the plant body such as leaves, stem and roots. It is one cell layer thick and covered with cutin and protects the underlying tissues present in the plant body.

Epidermis is considered as a protective tissue because it forms the outer layer of the plant body. The outer walls of the epidermis are usually thick and covered with organic substances like cutin. The thick cutinized wall greatly reduces loss of water by transpiration.

4. Components of xylem are –

(i) Xylem vessel

(ii) Tracheids

(iii) Xylem fibres

(iv) Xylem parenchyma

Of these components, only xylem parenchyma is living, rest all are dead.

5. Functions of xylem parenchyma:

(i) They store food.

(ii) Help in the conduction of water and minerals.

6.

Components of phloem	Function
Sieve tube	Transportation of food and nutrients.
Companion cells	Help sieve tubes perform their functions.
Phloem parenchyma	Storage food.
Phloem fibre	Provides mechanical support.

7. Blood is considered a connective tissue because it connects the body systems together by transporting nutrients, oxygen, hormones, waste materials, etc. from one part of the body to the other.

8. Meristems are classified as apical, intercalary and lateral on the basis of their positions in the plant body.

Apical meristem	Lateral meristem
Located at the growing tips of root, stem and their branches.	Located on the sides of roots and stems.
It helps in the increase in length of stems and roots.	It helps in growth in thickness by the addition of secondary tissue.

V. Long Answer Type Questions

A. Answer these questions.

1. Meristematic tissue is a group of young cells that have the capacity of active cell division. They are living thin walled cells, compactly packed without intercellular spaces. The vacuoles are almost absent. They have dense cytoplasm and large, prominent centrally located nucleus. According to their positions in the plant body, meristems are categorized into three types:

(i) **Apical meristem:** It is located at the growing tips of stem, roots and their branches. It divides to increase the length of stems and roots. It gives rise to primary permanent tissues.

(ii) **Lateral meristem (cambium):** Located on the sides of roots and stems, it is responsible for increase in the diameter of the plant roots and stems. These tissues are also responsible for growth in thickness by addition of secondary tissues and this phenomenon is called secondary growth.

(iii) **Intercalary meristem:** These are the parts of apical meristem which get separated from the apex due to the development of permanent tissue in between. They are mostly present at the base of nodes, internodes and leaves. They help in elongation of the organs.

2. Various types of epithelial tissues are –

(i) **Squamous epithelium:** It is formed by flattened, polygonal cells which are closely fitted together like tiles in a mosaic floor.

Function: It protects the underlying parts from mechanical injury, germs and drying up.

(ii) **Cuboidal epithelium:** It is made up of cuboidal cells, which are more or less square shaped, that are of equal height and width. In surface view, they look polygonal in shape. The nuclei are round in shape and lie in the centre of the cells.

Function: It helps in absorption, excretion, secretion as well as provides mechanical strength.

(iii) **Columnar epithelium:** It is formed of tall pillar-like cylindrical cells, lying side by side. They bear oval nuclei at the basal part of the cell.

Function: Helps in absorption through the lining of stomach and intestine and secretion of mucus through the goblet cells.

(iv) **Ciliated epithelium:** Ciliated epithelium may be cuboidal or columnar. These cells have cilia at their free end which keeps lashing and moving the material entering the organs.

Function: In respiratory tract, the cilia help to push mucus towards the pharynx; in oviduct, it helps to move an egg towards the uterus; it helps to keep the urine moving in the nephron of the kidney.

(v) **Glandular epithelium:** Glands develop from epithelium tissue which can secrete substances at the epithelial surface. Sometimes there is inward folding of epithelial tissues forming multicellular gland, called glandular epithelium.

Function: Cells of glandular epithelium are modified and specialized to secrete certain substances. Glandular epithelium helps in secretion of hormones, sweat, saliva, digestive enzymes, etc.

3. Fluid connective tissue is a kind of connective tissue which have fluid matrix. Blood and lymph are fluid connective tissues.

Blood consists of blood corpuscles suspended in blood plasma. Plasma is a straw-coloured fluid which contain water, inorganic salts, organic substances like blood proteins and hormones. RBCs, WBCs and platelets are suspended in the plasma. Blood flows to all parts of the body and connects different parts of the body. They help in transportation of oxygen, vitamins, nutrients and hormones to various cells and tissues and remove CO_2 and other waste from the cells.

Lymph is a transparent light yellow coloured fluid without RBCs. It contains WBCs called leucocytes. It plays an important role in body's immunity.

VI. Structured/Application/Skill Type Questions

A. Study the given diagram and answer the following questions.

1. Ciliated columnar epithelium

2. **a.** Cilia; **b.** Nucleus; **c.** Cytoplasm

3. This epithelium lines most of the respiratory tract and Fallopian tube. Cilia at their free end keep lashing and moving the material entering the organs e.g. in respiratory tract, it helps to push mucus towards the pharynx; in oviduct, it helps to move the ovum towards the uterus.

B. Study the given diagrams and answer the following questions.

1. **a.** Squamous epithelium as it is made up of very thin and flat cells, closely fitted like tiles.

   b. Involuntary muscles as the cells are spindle shapes, uninucleated and lacks striations.

2. Squamous epithelium lines the blood vessels, alveoli of lungs and skin. It protects the underlying parts from mechanical injury.

   Involuntary muscles are found in the iris of the eye, in the bronchi of lungs etc. They carry out involuntary movements which are not under the control of one's will.

C. Given below is the structure of a nerve cell.

1. A nerve cell is the structural and functional unit of the nervous system.
2. **a.** Nucleus

   b. Dendrons

   c. Nodes of Ranvier

   d. Axon
3. Nerve cells are specialized to respond to stimuli and transmit its response very rapidly from one part of the body to another.

D. Given below is an incomplete table relating to plant tissues, their location and function. Study the table and fill in the blanks numbered from 1 to 10.

1. Growing tips of root and shoot
2. Increase in length of stems and roots
3. Parenchyma
4. Intercalary meristem
5. Cambium (lateral meristem)
6. Sides of roots and stems
7. Beneath the epidermis in the stem and petiole or leaf stalk of dicot plants
8. Provides mechanical strength and elasticity to plant organs.
9. Outermost protective layer that covers the entire surface of the plant.
10. Protects all parts of the plant, help in absorption of water and minerals in roots, reduce loss of water in desert plants.

E. Given below is an incomplete table relating to certain tissues found in animals, its location and function. Study the table and fill in the blanks numbered from 1 to 9.

1. Lining of blood vessels, mouth, alveoli of lungs
2. Protects the underlying parts from mechanical injury, germs and drying up.
3. Ciliated columnar epithelium
4. Cuboidal epithelium
5. Kidney tubules, sweat glands and salivary glands.
6. Larynx, trachea, at the end of bones and nasal septum.
7. Smoothens bones, prevents wear and tear of long bones, provides support and flexibility to the body parts.
8. Cardiac muscles.
9. Work rapidly, rhythmically and tirelessly contracting and relaxing throughout life.

F. Given below is a block diagram showing the types of permanent tissues in plants. Complete the diagram by filling the blanks from 1 to 6.

1. Simple permanent tissue
2. Complex permanent tissue
3. Collenchyma
4. Sclerenchyma
5. Sclereids
6. Phloem