

## Tissues

- Most of these cells are specialized to carry out specific functions. Each specialized function is taken up by a different group of cells. Since these cells carry out only a particular function, they do it very efficiently.
- In human beings, muscle cells contract and relax to cause movement, nerve cells carry messages, blood flows to transport oxygen, food, hormones and waste material and so on.
- In plants, vascular tissues conduct food and water from one part of the plant to other parts. So, multicellular organisms show division of labor.
- Cells specializing in one function are often grouped together in the body. This means that a particular function is carried out by a cluster of cells at a definite place in the body. This cluster of cells, called a **tissue**, is arranged and designed so as to give the highest possible efficiency of function.
- Tissue is a group of cells that possess a similar structure and perform a specific function in a living organism. Tissues are the building blocks of organs and organ systems.
- The study of tissue is known as **histology** and study of disease-related to tissue is known as **histopathology**.

## Animal Tissues

- Animal tissues are grouped into four types:
  - Connective Tissue
  - Muscle Tissue
  - Nervous Tissue

- Epithelial Tissue

## 1. Connective Tissues

- They are the group of tissues made up of cells separated by non-living material, called an extracellular matrix.
- This tissue provides shape to the different organs and maintains their positions. The cells of connective tissue are loosely spaced and embedded in an intercellular matrix. The matrix may be jelly-like, fluid, dense or rigid.

### Types:

- ★ Fluid Connective Tissue.
- ★ Fibrous Connective Tissue.
- ★ Skeletal Connective Tissue.

**For example:** Blood, bone, tendon, ligament and areolar tissues.

There are three types of connective tissue:

- Blood has a fluid (liquid) matrix called plasma, in which red blood corpuscles (RBCs), white blood corpuscles (WBCs) and platelets are suspended. The plasma contains proteins, salts and hormones. Blood flows and transports gasses, digested food, hormones and waste materials to different parts of the body. It is a type of **Fluid Connective Tissue.**
- Bone is another example of a connective tissue. It forms the framework that supports the body. It also anchors the muscles and supports the main organs of the body. It is a strong and nonflexible tissue. Bone cells are embedded in a hard matrix that is composed of calcium and phosphorus compounds. It is a type of **Skeletal Connective Tissue.**

- Two bones can be connected to each other by another type of connective tissue called the ligament. This tissue is very elastic. It has considerable strength. Ligaments contain very little matrix and connect bones with bones. Tendons connect muscles to bones and are another type of connective tissue. Tendons are fibrous tissue with great strength but limited flexibility. It is a type of **Fibrous Connective Tissue**.

### Functions of Connective Tissue:

The connective tissue functions by **providing shape** and **maintains the position** of different organs in the body. It functions as the primary supporting tissue of the body.

**Other important and the major functions of connective tissue in the body are:**

1. Insulating.
2. Helps in binding the organs together and provides support.
3. It protects against the invasions of pathogens by their phagocytic activity.
4. Provides shape to the body, conserves body heat and also stores energy.
5. It is involved in the transportation of water, nutrients, minerals, hormones, gasses, wastes, and other substances within the body.

## 2. Muscle Tissue

Muscular tissue consists of elongated cells, also called muscle fibers. This tissue is responsible for movement in our body. Muscles contain special proteins called **contractile proteins**, which contract and relax to cause movement.

- We can move some muscles by conscious will. Muscles present in our limbs move when we want them to, and stop when we so decide. Such muscles are called **voluntary muscles**. Common voluntary skeletal muscles include the biceps, triceps, lats, abdominals, glutes, quadriceps, and hamstrings.
- The movement of food in the alimentary canal or the contraction and relaxation of blood vessels are involuntary movements. We cannot really start them or stop them. Smooth muscles or **involuntary muscles** control such movements. They are also found in the iris of the eye, in ureters and in the bronchi of the lungs.

**There are three types of muscle tissue:**

- **Skeletal Muscle** – they are typically attached to bones
- **Cardiac Muscle** – found in the heart.
- **Visceral or Smooth Muscle** – they are found in the inner walls of organs.

**Functions of Muscle Tissue:**

1. Muscle tissues are associated with their movements including walking, running, lifting, chewing, picking and dropping objects, etc. The other major functions of muscle tissue in the body are:
2. Helps in maintaining an erect position, or posture.
3. Helps in the constriction of organs and blood vessels.
4. Involved in both voluntary and involuntary movements.
5. Involved in pumping blood and regulating the flow of blood in arteries.
6. Controls respiration by automatically driving the movement of air both into and out of our body.

### 3. Nervous Tissue

They are the main tissue components of the brain and spinal cord in the central nervous system. While, in the peripheral nervous system, the neural tissue forms the cranial nerves and spinal nerves.

A neuron consists of a cell body with a nucleus and cytoplasm, from which long thin hair-like parts arise. Usually each neuron has a single long part (process), called the **axon**, and many short, branched parts (processes) called dendrites.

### Functions of Nervous Tissue

The nervous tissue forms the communication network of the nervous system and is important for information processing.

**The other major functions of nervous tissue in the body are:**

1. Response to stimuli.
2. Stimulates and transmits information within the body.
3. Plays a major role in emotions, memory, and reasoning.
4. Maintains stability and creates an awareness of the environment.
5. Nervous tissue is involved in controlling and coordinating many metabolic activities.

### 4. Epithelial Tissue

They are formed by cells which **cover the external parts of the body** organs and line the organ surfaces such as the surface of the skin, the reproductive tract, the airways, and the inner lining of the digestive tract. It also forms a barrier to keep different body systems separate.

**Example:** skin, the lining of the mouth, the lining of blood vessels, lung alveoli and kidney tubules are all made of epithelial tissue.

Epithelial tissue cells are tightly packed and form a continuous sheet.

**Different types of epithelial tissues have different structures that match their jobs:**

- **Simple squamous epithelium:** Very thin and flat cells, found in places where substances need to move through easily, like blood vessels and lung alveoli.
- **Stratified squamous epithelium:** Many layers of squamous cells, found in areas that need protection, like the skin, mouth, and oesophagus.
- **Columnar epithelium:** Tall cells found in areas where absorption and secretion happen, like the lining of the intestine. In the respiratory tract, it has tiny hairs called cilia that help move mucus.
- **Cuboidal epithelium:** Cube-shaped cells found in places like kidney tubules and salivary gland ducts, providing mechanical support.

### **Functions of Epithelial Tissue:**

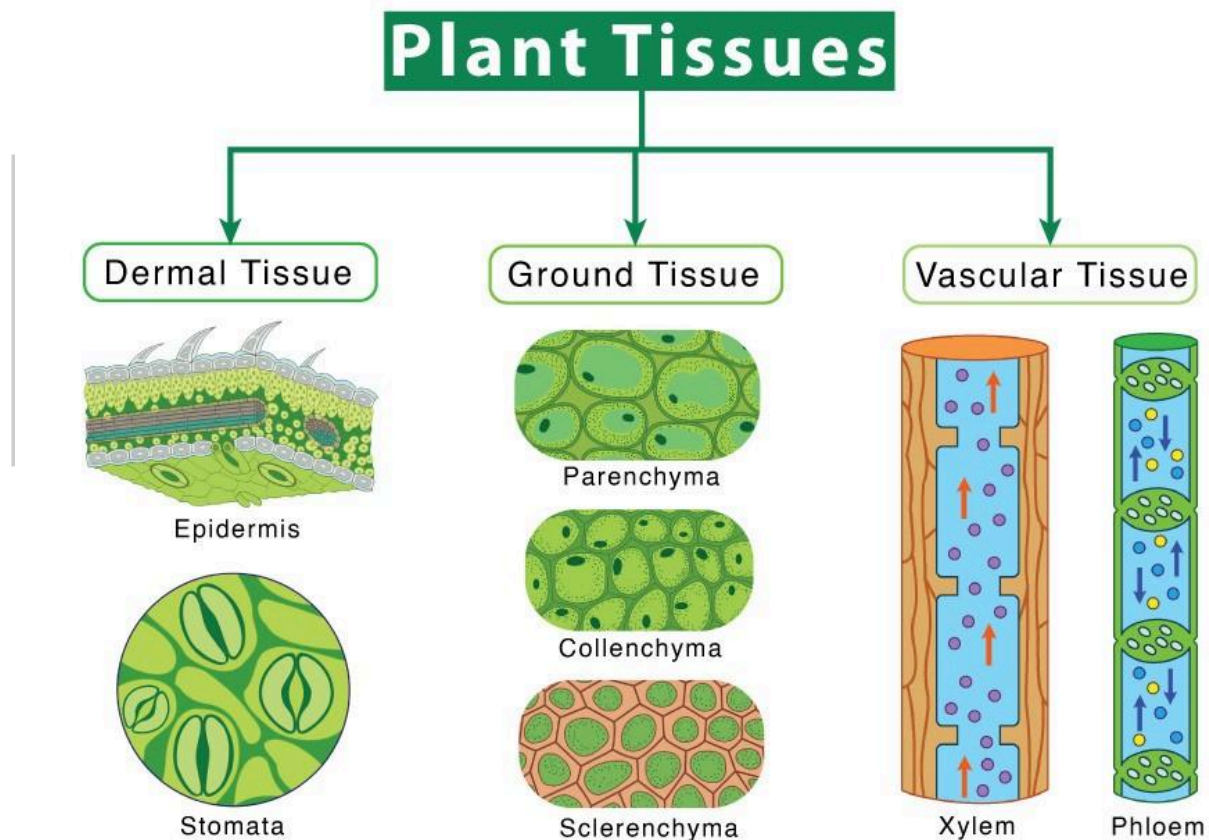
**This tissue performs a wide variety of functions including:**

1. Play a major role in sensory reception, excretion, filtration and other metabolic activities.
2. Provide mechanical strength and resistance to the underlying cells and tissue.
3. It is involved in the movement of materials through the process of filtration, diffusion and secretion.
4. Protects the internal organs against the invasions of pathogens, toxins, physical trauma, radiation, etc.

5. Epithelial tissues are also involved in secreting hormones, enzymes, mucus and other products from ducts and transporting it to the circulatory system.

## Plant Tissues:

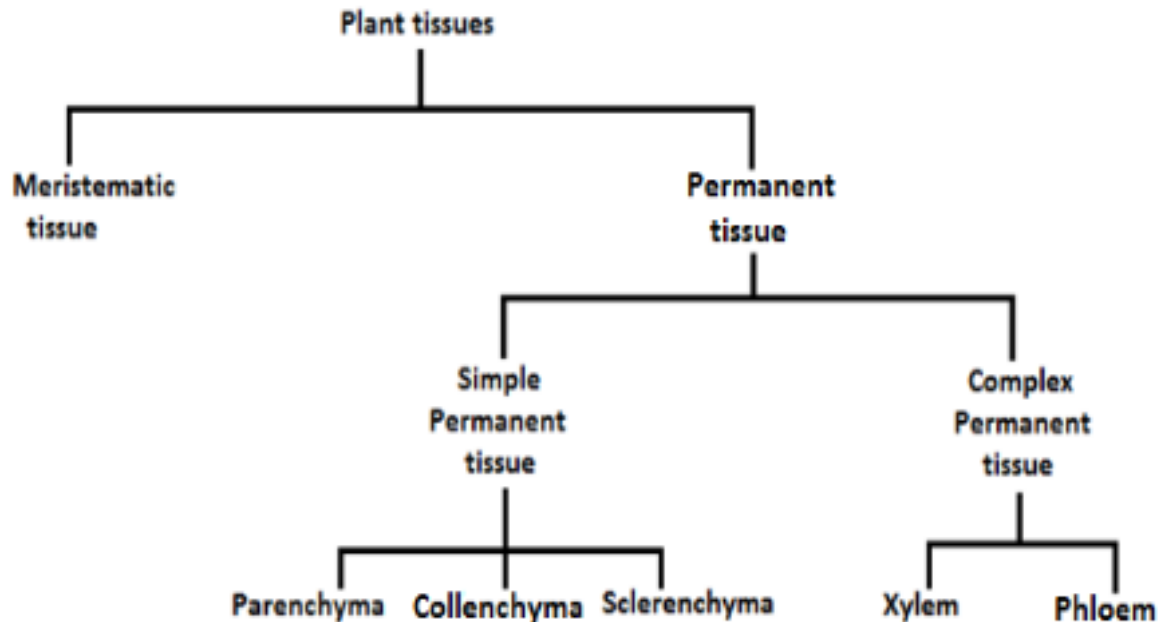
**Plant Tissues:** Plant anatomy involves the study of different types of plant tissues. Tissues are groups of cells that work together to perform specific functions. The main types of plant tissues are:



**a. Meristematic Tissue:** Found in growing regions of plants, meristematic tissue consists of actively dividing cells. It allows for



plant growth and is responsible for producing new cells for primary and secondary growth.



**b. Dermal Tissue:** The outermost tissue layer of plants, dermal tissue covers and protects the plant. It includes the epidermis, which has a waxy cuticle to prevent water loss, and specialized structures like stomata for gas exchange.

**c. Ground Tissue:** Ground tissue forms the bulk of the plant body and performs various functions. It can be further divided into three types:

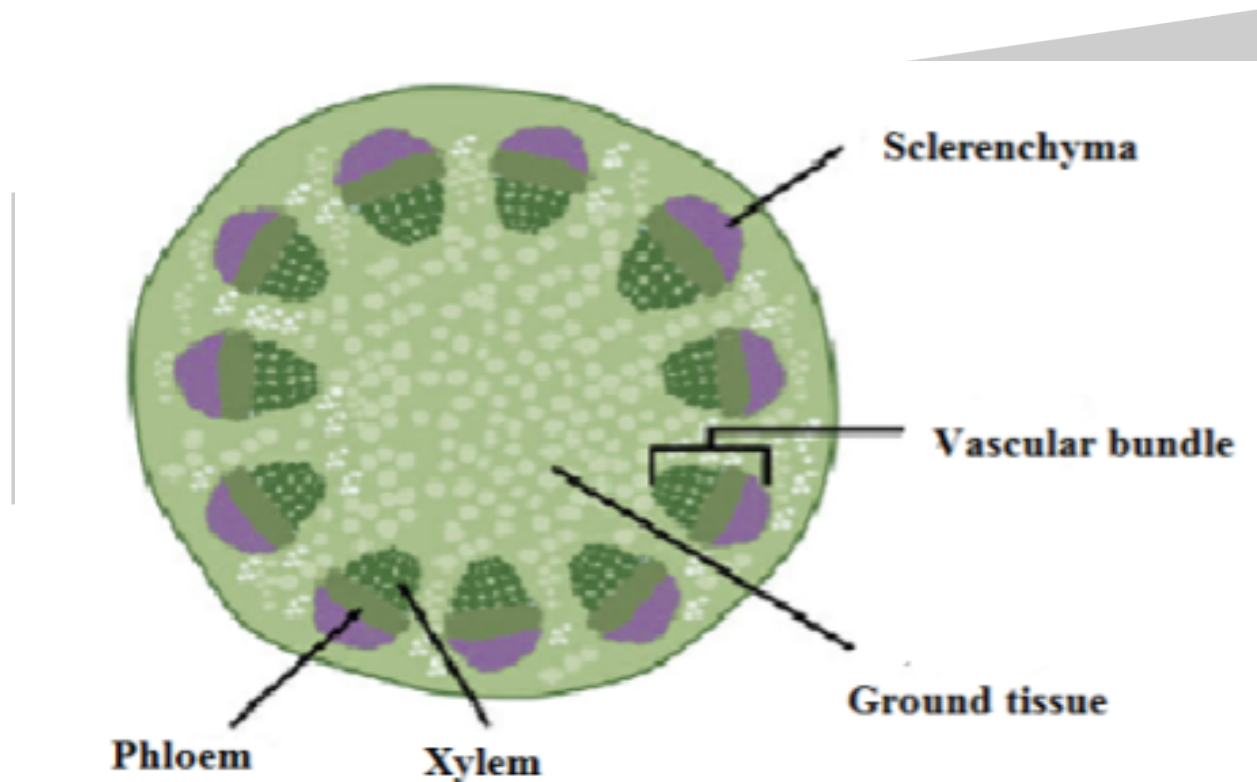
**Parenchyma:** Parenchyma cells are involved in photosynthesis, storage, and tissue repair. They have thin cell walls and often contain chloroplasts.



**Collenchyma:** Collenchyma cells provide mechanical support to growing parts of the plant. They have unevenly thickened cell walls, which provide flexibility.

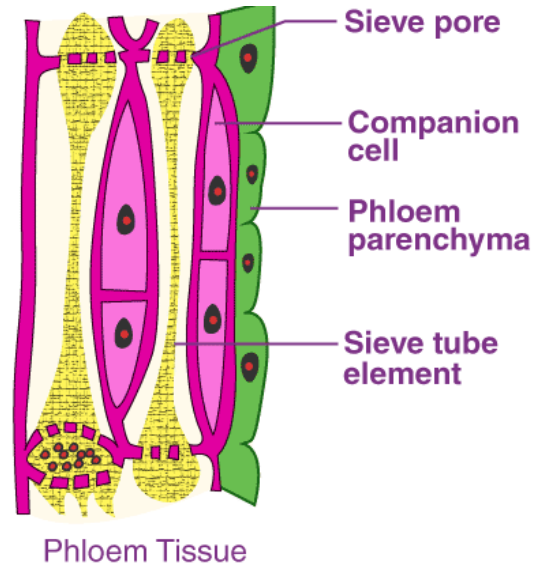
**Sclerenchyma:** Sclerenchyma cells provide rigid support to mature parts of the plant. They have thick, lignified cell walls and can be either fibers or sclereids.

**d. Vascular Tissue:** Vascular tissue is responsible for transporting water, nutrients, and sugars throughout the plant. It consists of two types:

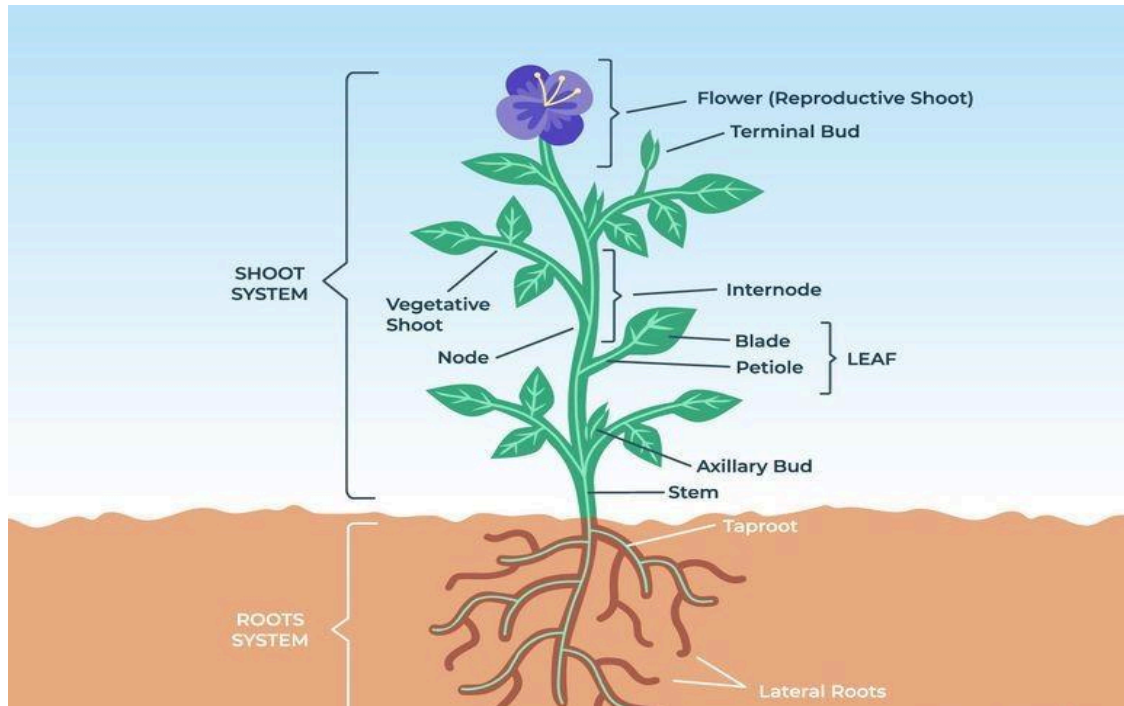


**Xylem:** Xylem tissue conducts water and minerals from the roots to the rest of the plant. It is made up of tracheids and vessel elements.

**Phloem:** Phloem tissue transports sugars and other organic molecules from the leaves to the rest of the plant. It is composed of sieve tubes and companion cells.



**Plant Organs:** Plant anatomy also involves the study of different plant organs, which are structures that serve specific functions. The main plant organs are:

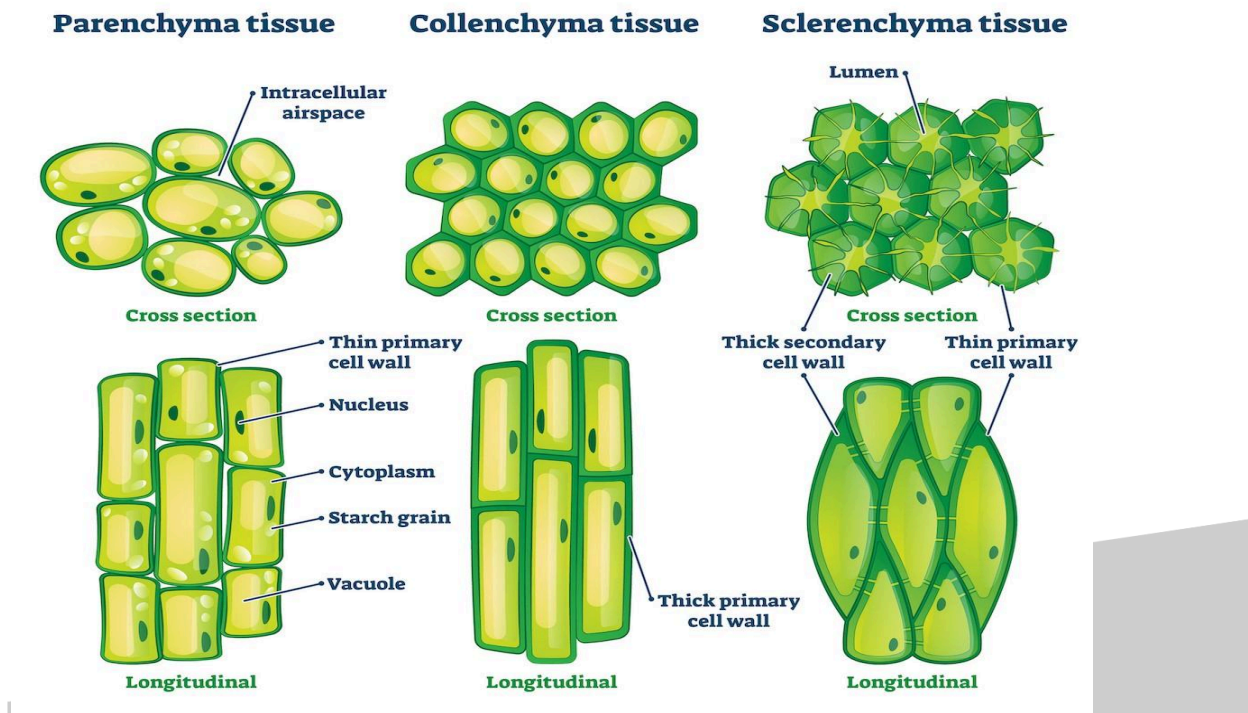


**a. Roots:** Roots anchor the plant in the ground and absorb water and nutrients from the soil. They can be classified into taproots (main root with lateral branches) or fibrous roots (several thin roots of similar size).

**b. Stems:** Stems provide support and transport water, nutrients, and sugars throughout the plant. They can be herbaceous (non-woody) or woody. Stems have nodes (points of leaf attachment) and internodes (spaces between nodes).

**c. Leaves:** Leaves are the main photosynthetic organs of plants. They have a flattened blade and a petiole that connects them to the stem. Leaves contain chloroplasts, which capture sunlight for photosynthesis.

**Plant Cell Types:** Plant anatomy also involves studying different types of plant cells. These include:



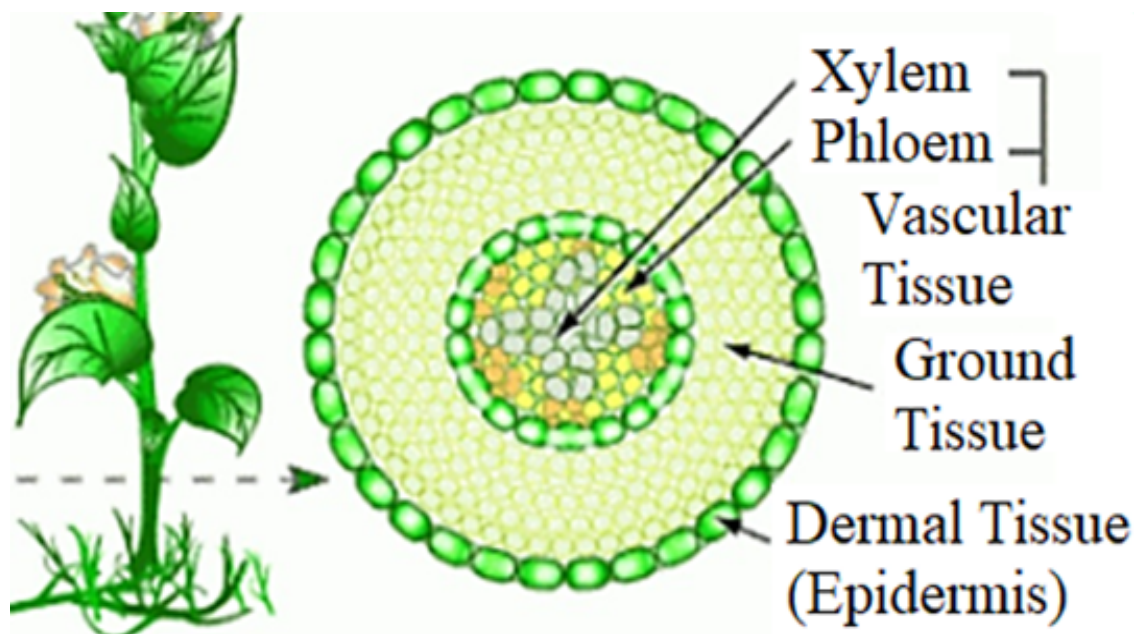
**a. Parenchyma Cells:** Parenchyma cells have thin cell walls and are involved in photosynthesis, storage, and tissue repair.

**b. Collenchyma Cells:** Collenchyma cells provide support and flexibility to growing plant parts.

**c. Sclerenchyma Cells:** Sclerenchyma cells provide rigid support to mature plant parts.

**d. Xylem Cells:** Xylem cells transport water and minerals from roots to other parts of the plant.

**e. Phloem Cells:** Phloem cells transport sugars and other organic molecules throughout the plant.



# L.A.B

Learn with Aman & Barkha