

For XAT , CMAT , MAT , IIFT Exam

TISSUE

- A group of cells that are similar in structure and/or work together to achieve a particular function forms a tissue.
- The study of tissue is known as histology

PLANT TISSUE

- Plants are composed of three major organ groups roots, stems and leaves. These are comprised of tissue working together for a common function
- Plant tissues are of two main types – **meristematic** and **permanent**
- **Meristematic tissue** is the dividing tissue present in the growing regions of the plant
- **Permanent tissues** are derived from **meristematic tissue** once they lose the ability to divide. They are **classified as simple and complex tissues**
- Parenchyma, collenchyma and sclerenchyma are three types of simple tissues.
- Xylem and phloem are types of complex tissues

MERISTEMATIC TISSUE

- The growth of plants occurs only in certain specific regions. This is because the dividing tissue, also known as meristematic tissue.
- Meristems are actively dividing tissues of the plant, that are responsible for primary (elongation) and secondary (thickness) growth of the plant.
- Depending on the region where they are present, meristematic tissues are classified as apical, lateral and intercalary.

Apical meristem

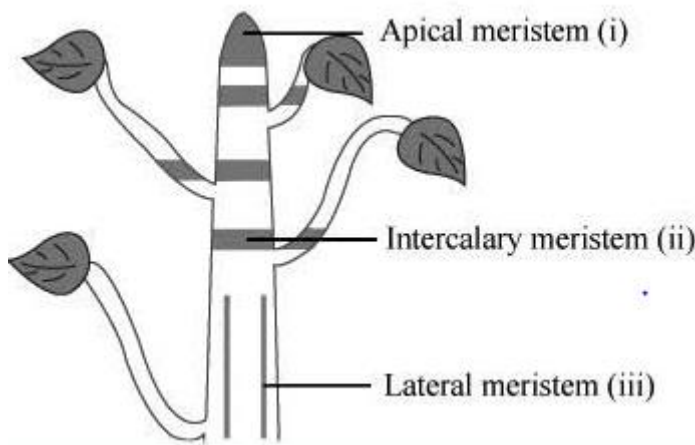
- Apical meristem is present at the growing tips of stems and roots and increases the length of the stem and the root. This is also called primary growth

Intercalary meristem

- It is located in between permanent tissues
- Intercalary meristem seen in some plants is located near the node

Lateral meristem

- This consists of cells which mainly divide in one place and cause the organ to increase in diameter and growth. It occurs beneath the bark of the tree in the form of cork cambium and in form of vascular cambium



PERMANENT TISSUE

- Plant tissue are characterized and classified according to their structure and function.
- These tissues can be simple consisting of single cell type. They can also be complex consisting of more than one cell type

SIMPLE PERMANENT TISSUES

- Simple tissues are homogeneous tissues composed of structurally and functionally similar cells.
- Simple permanent tissue types are
 1. Parenchyma
 2. Collenchyma
 3. Sclerenchyma

PARENCHYMA

- Parenchyma are simple permanent tissues composed of living cells.
- It occurs in all soft parts of plants like cortex of roots and is meant for storage of food and provides turgidity to softer parts of plants
- The parenchyma stores food
- In potato, parenchyma vacuoles are filled with starch. In apple, parenchyma stores sugar

- Certain parenchymatous tissues contain chloroplast and perform photosynthesis, and then it is called chlorenchyma
- In aquatic plants, large air cavities are present in parenchyma to help them float. Such a parenchyma type is called aerenchyma
- The outermost protective layer of plants is made up of specially modified parenchyma. These cells are without intercellular spaces

COLLENCHYMA

- Collenchyma is a living tissue found beneath the epidermis.
- Collenchyma allows bending of various parts of a plant like tendrils and stems of climbers without breaking. It also provides mechanical support.
- It occurs in hypodermis of stem and petiole and around veins
- Generally it is absent in root, leaves and monocot stems

SCLERENCHYMA

- Sclerenchyma consists of thick walled cells which are often lignified. Sclerenchyma cells are dead and do not possess living protoplasts at maturity. Sclerenchyma cells are grouped into fibres and sclereids
- Sclerenchyma is the tissue which makes the plant hard and stiff. We have seen the husk of a coconut. It is made of sclerenchymatous tissue. The cells of this tissue are dead

COMPLEX PERMANENT TISSUE

- Complex tissues are made of more than one type of cells. All these cells coordinate to perform a common function.
- Xylem and phloem are examples of such complex tissues.

XYLEM

- Xylem performs the function of conduct of water and minerals upwards from the roots to the stem and leaves
- Xylem consists of tracheids, vessels, xylem parenchyma and xylem fibres
- Tracheids and vessels have thick walls, and many are dead cells when mature. Tracheids and vessels are tubular structures. This allows them to transport water and minerals vertically.
- **Xylem fibres:** These cells are elongated, lignified and pointed at both the ends. Xylem fibres provide mechanical support to the plant
- **Xylem parenchyma:** These are living and thin walled cells. The main function of xylem parenchyma is to store starch and fatty substances.

PHLOEM

- Phloem transports food from leaves to other parts of the plant.
- Phloem is made up of five types of cells: sieve cells, sieve tubes, companion cells, phloem fibres and the phloem parenchyma
- Except phloem fibres, other phloem cells are living cells

- **Phloem parenchyma:** The phloem parenchyma are living cells which have cytoplasm and nucleus. Their function is to store food materials.

ANIMAL TISSUES

- The structure of animal tissue is directly related to its function. Tissue is groups of cells with a basic structure and function
- Blood and muscles are both examples of tissues found in our body.
- On the basis of the functions they perform we can think of different types of animal tissues, such as epithelial tissue, connective tissue, muscular tissue and nervous tissue.
- Blood is a type of connective tissue, and muscle forms muscular tissue.

EPITHELIAL TISSUE

- The covering or protective tissues in the animal body are epithelial tissues. Epithelium covers most organs and cavities within the body. . It also forms a barrier to keep different body systems separate.
- Epithelial tissue cells are tightly packed and form a continuous sheet.
- Anything entering or leaving the body must cross at least one layer of epithelium. As a result, the permeability of the cells of various epithelia plays an important role in regulating the exchange of materials between the body and the external environment and also between different parts of the body.
- Depending on shape and function, epithelial tissue is classified as squamous, cuboidal, columnar, ciliated and glandular

CONNECTIVE TISSUE

- It is one of the most abundant and widely distributed tissue. It provides structural frame work and gives support to different tissues forming organs. It prevents the organs from getting displaced by body movements.
- **Blood** is a type 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 gases, digested food, hormones and waste materials to different parts of the body.
- Lymph is a colourless fluid filtered out of the blood capillaries. It consists of plasma and white blood cells. It mainly helps in the exchange of materials between blood and tissue fluids
- **Bone** is another example of a **connective tissue**
- It is a strong and nonflexible tissue
- Bone cells are embedded in a hard matrix that is composed of calcium and phosphorus compounds
- Areolar connective tissue is found between the skin and muscles, around blood vessels and nerves and in the bone marrow. It fills the space inside the organs, supports internal organs and helps in repair of tissues
- 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.

- **Tendons** connect muscles to bones and are another type of connective tissue. Tendons are fibrous tissue with great strength but limited flexibility
- Another type of **connective tissue cartilage**, has widely spaced cells. Cartilage smoothens bone surfaces at joints and is also present in the nose, ear, trachea and larynx. We can fold the cartilage of the ears
- **Adipose tissue:** Its occurrence is below is below skin, between internal organs and in the yellow bone marrow. Its main function is to storage of fat and to conserve heat.

MUSCULAR TISSUE

- Striated, unstriated and cardiac are three types of muscle tissues
- Muscular tissue consists of elongated cells, also called muscle fibres. This tissue is responsible for movement in our body
- **Skeletal muscle:** These muscles are attached to the bones and are responsible for the body movements and are called skeletal muscles.
- Muscles present in our limbs move when we want them to, and stop when we so decide. Such muscles are called voluntary muscles. These muscles are also called skeletal muscles as they are mostly attached to bones and help in body movement
- **Smooth muscle:** These muscles are spindle shaped with broad middle part and tapering ends. There is a single centrally located nucleus. These fibrils do not bear any stripes or striations and hence are called non-striated. They are not under the control of our will and so are called involuntary muscles.
- The movement of food in the alimentary canal or the contraction and relaxation of blood vessels are involuntary movements. 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
- **Cardiac muscle:** It occurs only in the heart. The contraction and relaxation of the heart muscles help to pump the blood and distribute it to the various parts of the body

NERVOUS TISSUE

- Nervous tissue is made of neurons that receive and conduct impulses.
- The signal that passes along the nerve fibre is called a nerve impulse. Nerve impulses allow us to move our muscles when we want to. The functional combination of nerve and muscle tissue is fundamental to most animals. This combination enables animals to move rapidly in response to stimuli
- The brain, spinal cord and nerves are all composed of the nervous tissue. The cells of this tissue are called nerve cells or neurons. A neuron consists of a cell body with a nucleus and cytoplasm