



CLASS ;9

TISSUES

1. What are tissues?

A tissue is a group of similar cells that work together to perform a specific function in the body. In multicellular organisms like humans and plants, many cells join together to form tissue. Cells in a tissue usually have a similar structure and perform the same type of work. The formation of tissues helps organisms carry out different functions efficiently.

For example:

Muscle tissue helps in movement.

Nervous tissue helps in sending messages in the body.

Plant tissues help in support, transport, and photosynthesis.

The study of tissues is called Histology

2. What are the 'IMPORTANCE OF TISSUES'?

Ans: **Division of Work:-** Tissues allow different groups of cells to perform specific functions, making the body work efficiently.

Increased Efficiency:- Then similar cells work together, they perform their tasks faster and more effectively.

Formation of Organs: Different tissues combine to form organs such as the heart, lungs, and leaves in plants.

Growth and Repair:- Tissues help in the growth of the body and repair of damaged parts.

Specialized Functions:-

Tissues allow organisms to perform special functions like movement, transport of materials, protection, and communication.

Example: In the human body:

- ▶ Muscle tissue helps us move.
- ▶ Nervous tissue controls body activities.

Epithelial tissue protects the body.

In plants:

- ▶ Xylem transports water.
- ▶ Phloem transports food.
- ▶ Tissues are an important level of organization in living organisms. They help in efficient functioning, specialization, and coordination of different parts of the body. Without tissues, complex organisms would not be able to perform life processes properly.

3. Differentiate. Between GROWTH AND DIFFERENTIATION

Ans:

Growth: Growth is a permanent increase in size, mass, or number of cells

Differentiation: Differentiation is the process by which cells become specialized specific functions.

4.Explain GROWTH AND DIFFERENTIATION IN PLANTS

Ans:

Growth

- * Occurs mainly at meristematic tissues (regions of active cell division)

Types of growth:

- * Apical growth → increase in length (roots and shoots)

- * Lateral growth → increase in thickness (stem)

Characteristics of Plant Growth

Indeterminate growth (continues throughout life)

Growth is localized (only at specific regions like tips)

Can be influenced by light, water, and hormones

Differentiation:

- * Meristematic cells divide and then differentiate into permanent tissues

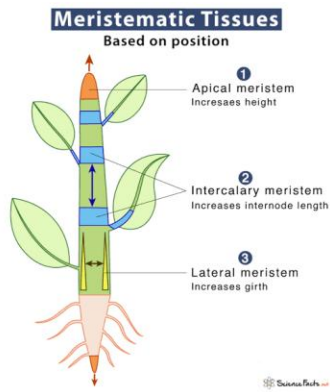
- * Examples:

Xylem → transports water

Phloem → transports food

Parenchyma, Collenchyma, Sclerenchyma

Once differentiated, cells usually lose the ability to divide.



5.Explain growth and differentiation in animals

Ans;Growth:Occurs throughout the body

* Growth happens due to cell division in many tissuesUsually determinate (stops after a certain age)

Characteristics of Animal Growth

Growth is uniform (not limited to specific regions)

Controlled by hormones

Stops after maturity in most animals

Differentiation:

* Cells differentiate into specialized types:

Muscle cells → movement

Nerve cells → transmission of signals

Blood cells → transport

6.What are MERISTEMATIC TISSUE?What are its Characteristics?

Ans;Characteristics:

- 1.Composed of immature, dividing cells.
- 2.Found in growing regions like shoot and root tips.
- 3.Cells have thin walls, dense cytoplasm, and prominent nuclei, but lack vacuoles and stored food.
- 4.Compact arrangement with no intercellular spaces.
- 5.Responsible for plant growth in length and girth

7.Write a brief note on simple Permanent tissue

Ans;PERMANENT TISSUE

Definition:

Permanent tissues develop from meristematic tissues through division and differentiation. These cells lose the ability to divide and acquire specific shapes, sizes, and functions.

Characteristics:

Cells may be living or dead.They can be oval, round, polygonal, or elongated.

Classified into:*Simple Permanent Tissue (made of one type of cell).

Complex Permanent Tissue (made of multiple types of cells).

A) Simple Permanent Tissue

Definition:

Simple permanent tissues consist of similar cells that perform a common function, primarily providing protection and support.

- ▶ Cells have dense cytoplasm, small nuclei, large vacuoles, and intercellular spaces.

Functions:

- ▶ Stores food and provides support.

Specialized Forms:

Chlorenchyma: Contains chloroplasts and performs photosynthesis; found in leaf tissues.

- ▶ Aerenchyma: Contains large air cavities that provide buoyancy, helping aquatic plants like water hyacinth float.

Collenchyma:

Features:

- ▶ Consists of living, elongated cells with unevenly thickened walls due to pectin deposition.
- ▶ Located below the epidermis in stems and leaves; absent in roots and monocots.
- ▶ Minimal or no intercellular spaces.

- Functions:

- Provides flexibility, elasticity, and mechanical support.
- Prevents leaf margins from cracking due to external forces like wind.

Sclerenchyma:

Features:

- Composed of dead cells with thick, lignin-reinforced walls, making them rigid.

Cells are closely packed with no intercellular spaces.

- Found in stems, roots, veins of leaves, and outer coverings of seeds and nuts.

Functions:

- Provides strength and rigidity to the plant.

Fibres:

Long, narrow, and tapering cells often found in bundles.

Common in commercial fibres like jute, flax, and coconut husk.

Sclereids:

Thick-walled, irregular cells found in seeds, fruit pulp, and other plant parts.

Responsible for the hardness of seeds and the gritty texture of fruits like guava and pear.

8. Differentiate between parenchyma, collenchyma and sclerenchyma tissues

Simple Permanent Tissues		
Parenchyma	Collenchyma	Sclerenchyma
These tissues are responsible for photosynthesis, storage of food, gaseous exchange and floating of plants.	These tissues are responsible for providing flexibility to the plants so that they can bend easily.	These tissues are responsible for making plants hard and rigid.
They are a group of living cells with cell wall made of cellulose.	They are a group of living cells with cell wall made of cellulose and pectin.	They are made up of dead cells having cell wall made of lignin.
The parenchyma cells have large intercellular spaces between them.	They have a little intercellular space in between them.	The cells do not have any intercellular spaces.
There are thin walls that surround each cell.	The cells present in these tissues are broad and irregularly thick at corners.	The cells have a long structure with thick walls.
They are found in leaves and newly formed branches.	They are present in leaves and stems of a plant.	They are found in stems, veins of the leaves and coverings of nuts and seeds.

9.Differences Between Xylem and Phloem

A.	Xylem	Phloem
1)	It transports water and minerals from roots to the apical parts of the plant.	1) It transports food material from the leaves to growing parts of the plant.
2)	Xylem consists of tracheids, vessels, xylem fibres and xylem parenchyma.	2) Phloem consists of sieve tubes, sieve cells, companion cells, phloem fibres and phloem parenchyma.
3)	Only xylem parenchyma is living.	3) Sieve tubes, sieve cells, companion cells and phloem parenchyma are living.
4)	Tracheids, vessels, xylem fibres are dead tissues.	4) Phloem fibres are dead tissues.
5)	Xylem gives mechanical strength to the plant.	5) Phloem does not give mechanical strength to the plant.
6)	Conduction of water by xylem is unidirectional i.e., from roots to apical parts of the plant.	6) Food material conduction is bidirectional i.e., from leaves to storage organs or growing parts or from storage organs to growing parts of plants.
7)	Xylem is star shaped.	7) Phloem is not in star shaped.
8)	Xylem occupies the center of the vascular bundle.	8) Phloem occurs on outer side of the vascular bundle.
9)	Tubular with hard walled cells.	9) Tubular with soft walled cells.

10.What is epidermis ? What are its significance

Ans: A. Epidermis

Characteristics:

The epidermis is the outermost layer covering all plant organs, derived from parenchymal cells.

Special Features:

1. Cuticle:

◆ A waxy, waterproof layer formed by the deposition of cutin on the epidermis of aerial parts.

Reduces water loss by limiting transpiration.

2. Stomata:

❖ Small openings present on the lower epidermis of dicot leaves, surrounded by kidney-shaped guard cells (dumb-bell shaped in monocots).

Allow gas exchange and regulate water vapor loss through transpiration, aneb diw allo ilam?

*Transpiration creates a pulling force (transpiration pull) that aids in water uptake by roots.

3. Root Hairs:

* Hair-like projections of the root epidermis (epiblema) that increase the surface area for absorbing water and minerals.

B. Cork (Phellem)

Formation:

Found in older stems and roots of woody plants.

**Produced by cork cambium (phellogen), which generates cork (phellem) on the outside and secondary cortex (phelloderm) on the inside.

Characteristics:

Consists of dead cells with thick walls reinforced by suberin, a waxy substance that makes the cells waterproof and gas-impermeable.

Intercellular spaces are absent.

Functions:

1. Protects against water loss, infections, and physical damage.
2. Reduces dehydration by conserving water.

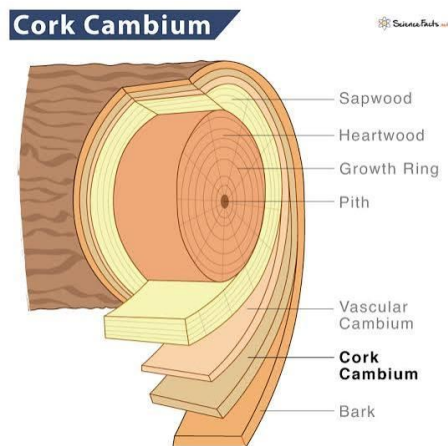
3. Lenticels (pores in cork) enable gas exchange for inner tissues.

It shields internal tissues from mechanical damage and microbial invasion

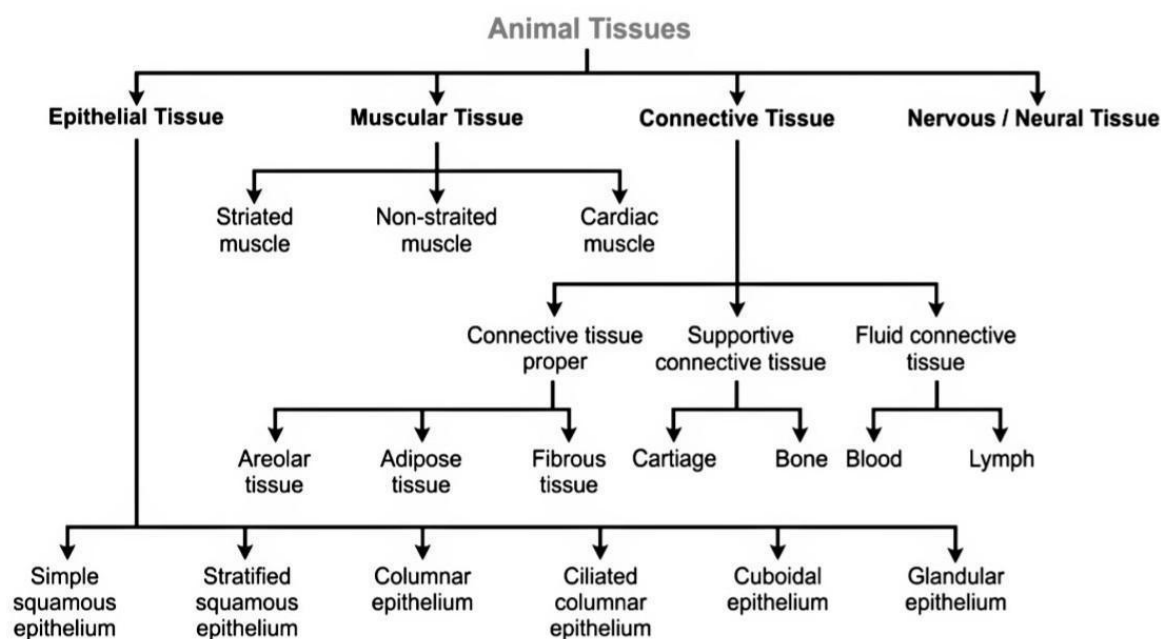
Commercial Uses:

Cork is lightweight, compressible, and fire-resistant.

It is widely used in sports equipment like cricket bats, table tennis paddles, and shuttlecocks.



10. What are the different types of animal tissues?



11. Make a comparison on cartilage and bone

Bones	Cartilage
Bones are the hard, inelastic and a tough organ that forms part of the vertebral skeleton.	Cartilage is a soft, elastic and flexible connective tissue that protects the bone from rubbing against each other.
Bones are of two types: compact or spongy.	Cartilage is of three types: Hyaline cartilage, fibrocartilage and elastic cartilage.
Bone cells are known as osteocytes.	Cartilage cells are known as chondrocytes.
Presence of blood vessels.	Absence of blood vessels (nutrients are obtained through diffusion)
The matrix is both organic and inorganic.	The matrix is completely organic.
Has deposits of calcium salts.	May or may not have deposition of calcium salts.

12. Explain the structure and function of a neuron with a neat diagram

Structure of a Neuron

A neuron consists of two primary parts:

1. Cyton (Cell Body):

The cell body contains a central nucleus surrounded by cytoplasm.

→ The cytoplasm contains Nissl's granules, which are ribosome-rich structures involved in protein synthesis.

2. Cell Processes:

These are extensions of the cell body that facilitate signal transmission.

a) Dendrites:

Short, branched extensions that carry incoming signals toward the cell body.

Called afferent processes because they receive impulses from receptors or other neurons.

b) Axon:

A single, long extension that carries signals away from the cell body.

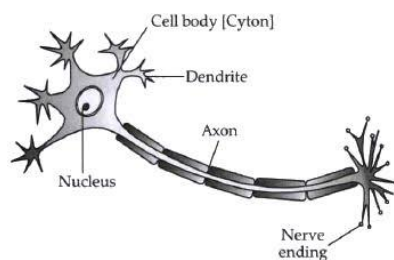
Known as an efferent process.

Axons are uniform in thickness and end in thin branches called telodendria, which terminate in **synaptic knobs**.

The axon is the longest part of the neuron, with some exceeding a meter in length.

Functions of Nervous Tissue:

1. Detects and processes stimuli from the environment.
2. Transmits nerve impulses to coordinate and regulate body functions
3. Enables communication between neurons through connections at synaptic knobs.



13. What are the components of a joint?

Mention about its types based on movement

Ans ; **Key Components of a Joint**

To keep these movements smooth, joints rely on a few specific structures:

> **Cartilage:** A smooth, slippery coating on the ends of bones that prevents them from rubbing together.

Synovial Fluid: A lubricant that acts like "oil" for the joint.

Ligaments: Tough, elastic tissues that connect bone to bone, keeping the joint stable.

Tendons: Thick cords that connect muscle to bone, allowing the muscles to pull on the bones to create

Joints

Joints are the meeting points of bones. They are defined by how they move them.

Movement-Based Classification

Immovable (Fibrous): Bones are fused for stability and protection.

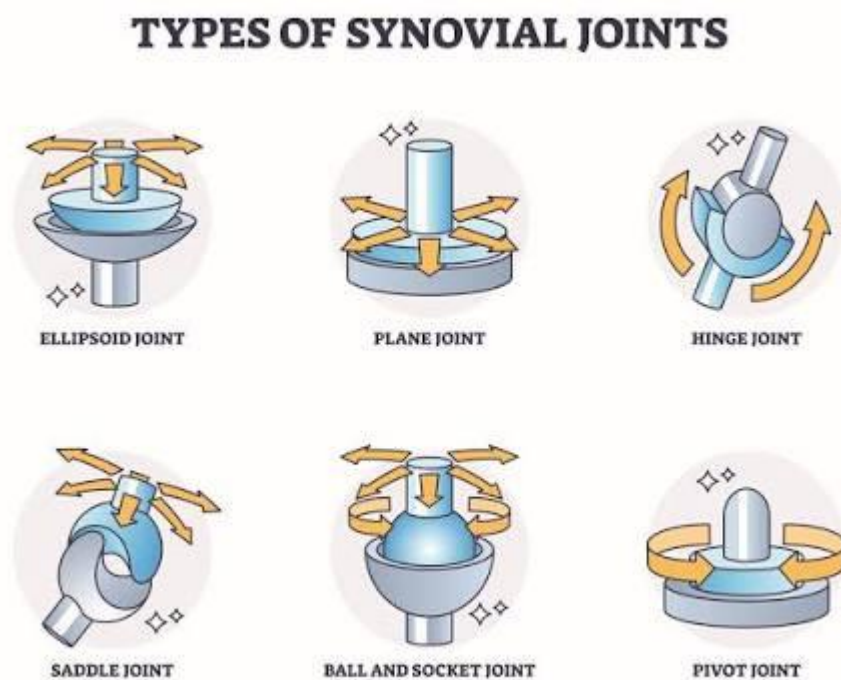
► Example: Skull sutures.

Slightly Movable (Cartilaginous): Connected by cartilage, allowing limited flexibil

Example: Spinal vertebrae.

Freely Movable (Synovial): The most common joints, providing a wide range of the fluid-filled cavities.

Types of Synovial (Freely Movable) Joints.



14.what are the importance of musculoskeletal system

Ans;IMPORTANCE OF THE MUSCULOSKELETAL SYSTEM

Support: Gives body shape and framework.

Movement: Bones and muscles work together as levers.

Protection: Shields vital organs like the heart, brain, and lungs.

* Blood cell production: Bones (bone marrow) produce red and white

Mineral storage: Bones store calcium and phosphorus.

15. Mention briefly about the techniques and medical recommendation in recovery from muscular injuries

Ans; The techniques and medical recommendations for recovery from muscular injuries. Recovery from a muscular injury involves a combination of immediate first aid and long-term

Immediate First Aid; The R.I.C.E. Technique

The most common medical recommendation for a fresh muscular injury (like a strain or a pull) is the RICE protocol. This helps minimise internal bleeding and swelling of the muscle fibers

R-Rest Stop any physical activity immediately. Continuing to move can cause further tearing of muscle fibers and connective tissues.

I-Ice Apply an ice pack for 15-20 minutes, every few hours, Cold causes vasoconstriction (narrowing of blood vessels), which reduces swelling and numbs the pain,

C-Compression: Wrapping the injured area with an elastic bandage helps provide support and prevents the accumulation of fluid (edema) in the tissues

E-Elevation: Keep the injured muscle raised above the level of the heart, This uses gravity to help drain excess fluid away from the injury site

Advanced Medical Techniques;

When an injury is more severe, doctors may recommend specific techniques to help the muscle tissue regenerate properly

16. Write about the significant contribution of professor Sipra Guha Mukherjee and professor S.C. Maheshwari in plant cell and tissue culture research in India

Ans; Significant contributions of Professor Sipra Guha Mukherjee and Professor S.C. Maheshwari in the plant cell and tissue culture research in India

India has made important contributions to plant cell and tissue culture, a branch of biotechnology that helps in growing plants under controlled laboratory conditions. This technique is widely used for rapid plant propagation, disease-free crops, and conservation of rare species.

Two notable Indian scientists in this field are:

Sipra Guha-Mukherjee

She was a pioneer in plant tissue culture research in India

Worked extensively on haploid plant production, especially in crops like tobaccos.

Her research helped in developing plants with desired genetic traits faster, which is very useful in crop improvement

. She contributed to making tissue culture techniques more efficient and practical for Indian agriculture.

Importance: Her work helped scientists produce improved plant varieties in less time, benefiting agriculture and research.

S.C. Maheshwari

A renowned botanist known for his work in plant embryology and tissue culture

He introduced and developed techniques like anther culture (growing plants from pollen grains). Authored important books and trained many students, spreading knowledge of plant tissue culture across India. His research laid the foundation for modern plant biotechnology in India.

Importance: He played a key role in establishing tissue culture as an important scientific field in India.

Overall Contribution of India in Plant Tissue Culture

Development of micropropagation techniques for large-scale plant production.

Production of disease-free plants (e.g., banana, sugarcane).

Conservation of endangered plant species.

Support for agriculture and horticulture industries.

17. What are the components of blood

Components of Blood:

A straw-colored fluid constituting about 55% of blood volume.

1. Plasma:

◆ Composed of 90% water and 10% dissolved substances such as proteins (albumins, globulins, and fibrinogen), glucose, lipids, amino acids, vitamins, enzymes, hormones, urea, and uric acid

2. Blood Corpuscles:

Account for 45% of blood volume and include:

Red Blood Corpuscles (RBCs):

Small, biconcave, disc-shaped cells that lack nuclei in mature mammals.

* Contain haemoglobin, an iron-rich protein that gives blood its red color and facilitates transport.

* Produced in the bone marrow and have a lifespan of approximately 120 days before being destroyed in the liver and spleen.

White Blood Corpuscles (WBCs):

Rounded or amoeboid cells with nuclei, responsible for immune defense.

Produced in the bone marrow, spleen, thymus, and lymph nodes.

Two main types:

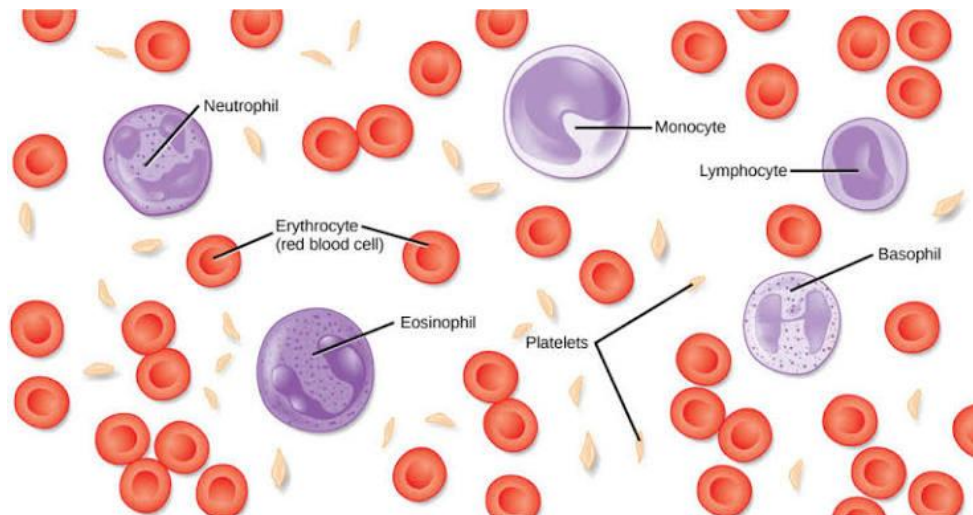
* Phagocytes: Engulf and destroy pathogens (e.g., neutrophils, eosinophils, basophils).

Immunocytes: Produce antibodies (e.g., lymphocytes).

Platelets (Thrombocytes):

Small, biconvex cell fragments derived from megakaryocytes in the bone marrow.

Involved in blood clotting and tissue repair with a lifespan of 8-14 days



Functions of Blood:

1. Transports oxygen, nutrients, hormones, and waste products.
2. RBCs facilitate the transport of oxygen and carbon dioxide
3. WBCs defend the body by producing antibodies and engulfing harmful microorganisms
4. Platelets help with blood clotting.
5. Regulates body temperature, water balance, and pH levels.