Class 9 Science CHAPTER – 6 Tissue

1. **Tissue** is a group of cells having similar origin, structure & function. Study of tissues is called **Histology**

2. In unicellular organism (Amoeba), single cell performs all basic functions, whereas in multi-cellular organisms (Plants and Animals) shows division of labour as Plant tissue & Animal tissues.

3. Plant tissues are two types: Meristematic & Permanent tissues.

4. **Meristems:** The Meristems are the tissues having the power of cell division. It is found on those region of the plant which grows.

Types of Meristems;

1. **The Apical meristems** – It is present at the growing tip of the stem and roots and increases the length.

2. **The lateral meristems** - present at the lateral side of stem anf root (cambium) and increases the girth.

3. **The intercalary meristems - present** at internodes or base of the leaves and increases the length between the nodes.

Permanent tissues: Two types such as Simple permanent tissues & Complex permanent tissues.

a) **Simple permanent tissues**: subdivided as

(i): **Parenchyma:** Tissues provide the support to plants.They are loosly packed and has large intracellular space.

- Parenchyma with chlorophyll which performs photosynthesis is called as

chlorenchyma.

- The parenchyma with large air spaces to give buoyancy is called as aerenchyma.

Parenchyma also stores food and water.

(ii) **Collenchyma**: Tissue provides mechanical support, thickened at the corners, have very little intercellular space. It allows easy bending of various parts of a plants without breaking

(iii) **Sclerenchyma:** Tissue makes the plant hard and stiff, thickened due to lignin and no intercellular space. Cells of this tissue are dead and commonly seen in the husk of coconut.

(iv) **Guard cells& Epidermal tissue**: the tissue aids in protection and exchange of gases.

Guard cells are kidney shaped in dicots, dumb bell shaped in monocots to guard the stomata. The epidermal tissues of roots aid in absorption of water and minerals. The epidermal tissues in desert plants have a thick waxy coating of Cutin with waterproof quality. The epidermal tissues form the several layer thick Cork or the Bark of the tree.

b) Complex permanent tissues: The complex tissues are made of more than one type

of cells. All these cells coordinate to perform a common function. They are subdivided as;

Xylem: It consists of tracheids, vessels, xylem parenchyma and xylem fibers. The cells have thick walls,

Function - help in conduction of water and minerals.

Phloem: It consists of sieve tubes, companion cells, phloem parenchyma, and phloem fibers.

Function:- Phloem transports food material to other parts of the plants.

6. **Animal tissues**: Sub divided as epithelial tissue, connective tissue, muscular tissue and nervous tissue.

1. **Epithelial tissue**: It is a protective covering forming a continuous sheet. Simple epithelium is the one which is extremely thin in one layer, whereas stratified epithelium are arranged in pattern of layers.

Depending on shape and function they are classified as:

a) **Squamous epithelium** in the lining of mouth and esophagus.

b) **Cuboidal epithelium** in the lining of kidney tubules and salivary glands.

c) **Columnar epithelium** in the intestine &Columnar epithelium with cilia in the lining of respiratory tract.

d) **Glandular epithelium** in the Glands aids in a special function as gland cells, which can secrete at the epithelial surface.

ii**) Connective Tissue**:

a**) Blood**: The Blood is a fluid connective tissue. Blood plasma has RBCs (Red Blood Cells) WBCs (White Blood Cells) and platelets. Blood plasma contains proteins, salts and hormones. Blood flows and transports gases, digested food, hormones and waste materials.

b**) Bone**: The bone is a connective tissue with hard matrix, composed of calcium and phosphorus. A bone is connected by another bone with another connective tissue called ligaments. A bone is connected by muscle with another connective tissue called tendon.

c) Cartilage: The cartilage is a connective tissue with solid matrix composed of proteins and sugars. It is commonly seen in nose, ear, trachea, and larynx.

d) Areolar Connective Tissue: It is found between the skin and muscles, around the blood vessels. It supports internal organs and aids in repair of tissues.

e)Adipose Connective Tissue: It is filled with fat globules for the storage of fat. It acts as insulator.

Muscular tissues: They have special contractile proteins responsible for movements. Three types, such as;

Striated muscles/skeletal muscles/voluntary muscles :

They are cylindrical, un-branched and multinucleated. They have dark bands and light bands.

Unstriated muscles /smooth muscles/involuntary muscles:

They are commonly called as Smooth muscles, having no striations (dark bands/ light bands are absent). Commonly found alimentary canal, uterus, Iris of an Eye. They are spindle shaped. Involuntary in nature.

Cardiac Muscles: They are commonly called as Heart muscles, cylindrical, branched and uni-nucleate. Involuntary in nature .

Nervous Tissue: The tissue responds to stimuli. The brain, spinal cord and nerves are composed of nervous tissue or neurons. A neuron consists of Cell Body, cytoplasm, Nucleus, Dendrite, Axon, nerve ending. The neuron impulse allow us to move our muscles when we want to respond to stimuli.

Tissues

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1. What is tissue?

Ans. It is a group of cells similar in origin and structure and they are specialized to perform a particular function like muscle cells in our body forms the muscle tissue that bring about body movements (specific function).

2. What is the utility of tissues in multi-cellular organisms?

Ans. There is a clear cut division of labour in multicellular organisms i.e. different parts of the body of a multicellular organism perform specific functions. For example, brain controls all other parts of body, heart pumps blood to all parts of body, kidneys remove waste materials from body, sense organs collect information from external sources for sensory perception etc. All these functions would never be possible without formation of tissues in multicellular organisms.

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1. Name types of simple tissues.

Ans. The simple tissues (found in plants) are of following three types:

i) parenchyma **ii)**
collenchyma **iii)**
Sclerenchyma

2. Where is apical meristem found?

Ans. The apical meristem is found at the apex (growing tips) of the stem and roots.

3. Which tissue makes up the husk of coconut?

Ans. Sclerenchymatous fibres

4. What are the constituents of phloem?

Ans. The constituents of phloem are: sieve tubes, companion cells, phloem parenchyma, phloem fibres (bast).

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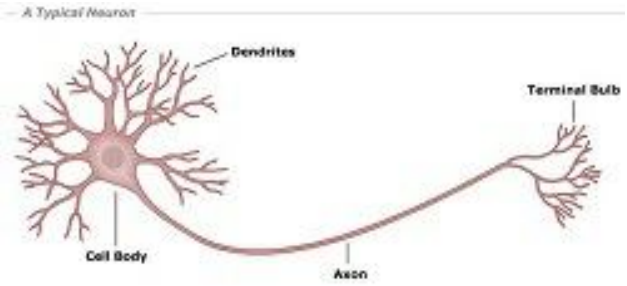
1. Name the tissue responsible for movement in our body.

Ans. Muscle/muscular tissue.

2. What does a neuron look like?

Ans. A neuron comprises of a cell body (cyton) along with one or more short branches(Dendron) and one hair like long branch (axon).



3. Give three features of cardiac muscles.

Ans. (i) Cardiac muscles are involuntary i.e. they don't work under our will.
(ii) Its cells are cylindrical, branched, striated and uninucleate.
(iii) It shows rhythmic contraction and relaxation throughout the person's life.

4. What are the functions of areolar tissue?

Ans. Areolar tissue is a kind of filler tissue found between skin and muscles, around our

blood vessels and nerve cells and also in the bone marrow. Its functions are therefore

i) To fill the space inside organs.

ii) To help in repair and maintenance of nearby tissues/organs.

iii) To support and prevent injuries to internal organs.

Chapter – end

1. Define the term "tissue".

Ans. It is a group of cells similar in origin and structure and they are specialized to perform a particular function like muscle cells in our body forms the muscle tissue that brings about body movements(specific function).

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

Ans. Xylem tissue is made up of following 4 types of elements:

i) Tracheids

ii) vessels

iii) Xylem fibres

iv) Xylem parenchyma

3. How are simple tissues different from complex tissues in plants?

Ans.

Simple tissue	Complex tissue
i) It is made up of only one type of cells. ii) All cells of this tissue work as individual units to perform a particular function. Eg. parenchyma, collenchyma and sclerenchyma tissues.	i) It is made up of more than one type of cells. ii) Cells of this tissue work together as one single unit to bring about a particular function. Eg. xylem and phloem tissues.

4. Differentiate between parenchyma, collenchyma and sclerenchyma on the basis of their cell wall.

Ans.

Parenchyma	Collenchyma	Sclerenchyma
Cell wall is thin and made up of cellulose.	Cell wall is irregularly thickened at corners due to deposition of pectin.	Cell wall is very thick due to deposition of impermeable substance lignin.

5. What are the functions of the stomata?

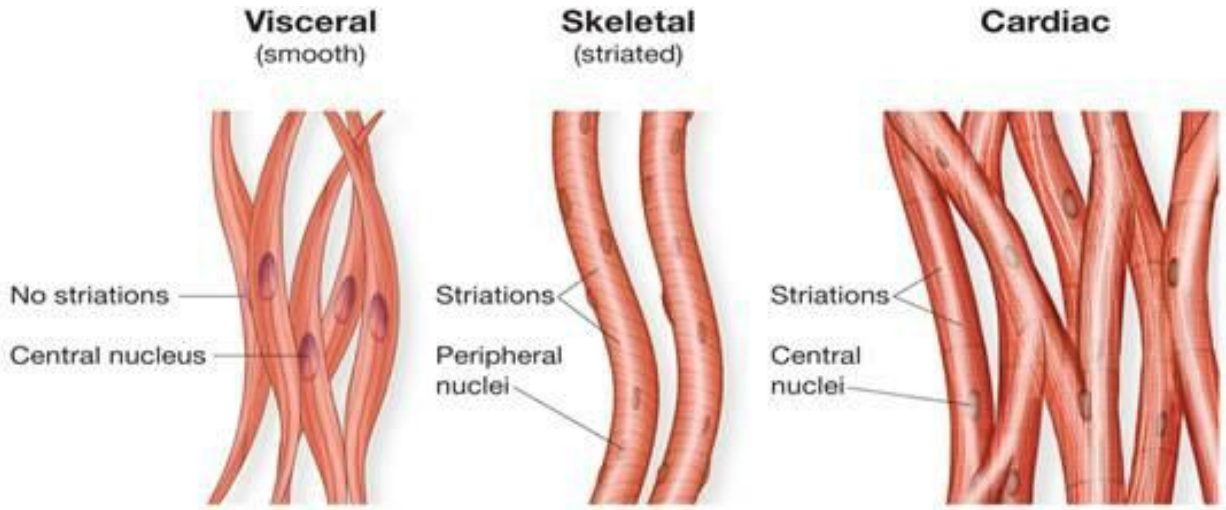
Ans. The functions of stomata are:

i) gaseous exchange like exchange of CO_2 and O_2.

ii) Process of transpiration i.e. loss of excess water in the form of water vapour occurs through stomata.

6. Diagrammatically show the difference between the three types of muscle fibres.

Ans.



Contracts	Slowly	Rapidly	Rapidly
Found	Viscera, blood vessels	Trunk, extremities, head and neck	Heart
Control	Involuntary	Voluntary	Involuntary

7. What is the specific function of the cardiac muscle?

Ans. Cardiac muscles are the muscles of heart that pumps blood to all parts of body and the pumping needs rhythmic contraction and relaxation of cardiac muscles throughout the life

without any fatigue.

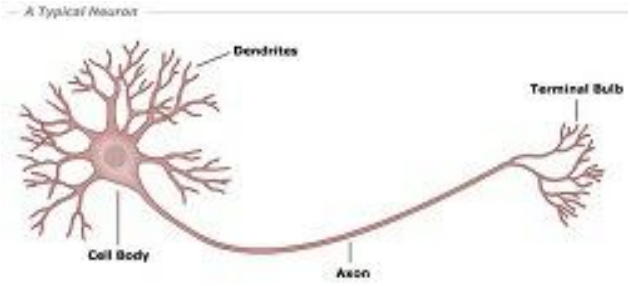
8. Differentiate between striated, unstriated and cardiac muscles on the basis of their structure and site/location in the body.

Ans.

Striated muscle	Unstriated muscle	Cardiac muscle
They show light and dark bands (striations) when we stain them. Their cells are elongated and cylindrical also unbranched. Cells are multinucleate.	They don't show any striations on staining. Their cells are long but spindle shaped and unbranched. Cells are uninucleate.	They show striations on staining. Their cells re cylindrical and branched. Cells are uninucleate.
They are responsible to bring about voluntary movements (like tongue, limbs etc)	They are involuntary in action (walls of tubular organs, blood vessels etc)	They are again involuntary in their function (contraction and relaxation of heart)

9. Draw a labelled diagram of a neuron.

Ans.



10. Name the following.

(a) Tissue that forms the inner lining of our mouth.

(b) Tissue that connects muscle to bone in humans.

(c) Tissue that transports food in plants.

(d) Tissue that stores fat in our body.

(e) Connective tissue with a fluid matrix.

(f) Tissue present in the brain.

Ans. (a) epithelial tissue

(b) tendons

(c) phloem

(d) adipose tissue

(e) blood

(f) nerve tissue

11. Identify the type of tissue in the following: skin, bark of tree, bone, lining of kidney tubule, vascular bundle.

Ans.

Skin	**Epithelial tissue**
Bark of tree	Sclerenchymatous tissue
Bone	Connective tissue
Lining of kidney tubule	Cuboidal epithelial tissue
Vascular bundle	Complex permanent tissue

12. Name the regions in which parenchyma tissue is present.

Ans. Parenchymatous tissue is present in the epidermis, cortex, pith of the stem, root, leaves, flowers and fruits of plants.

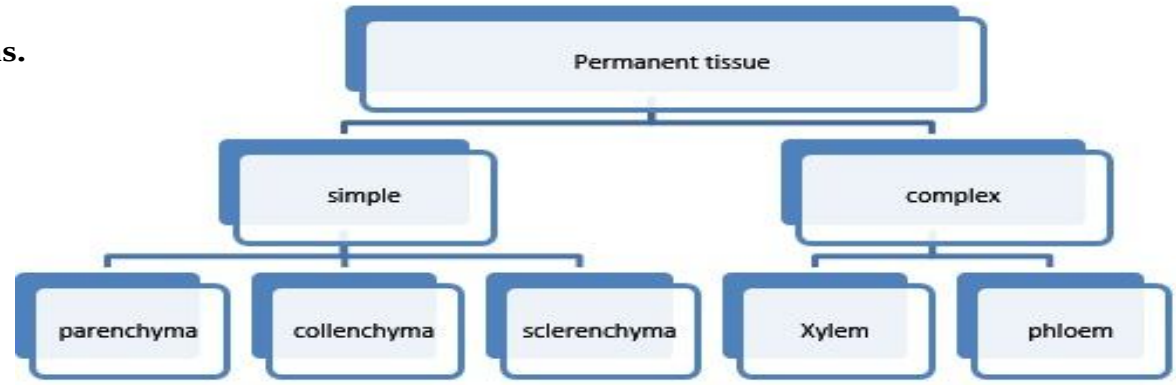
13. What is the role of epidermis in plants?

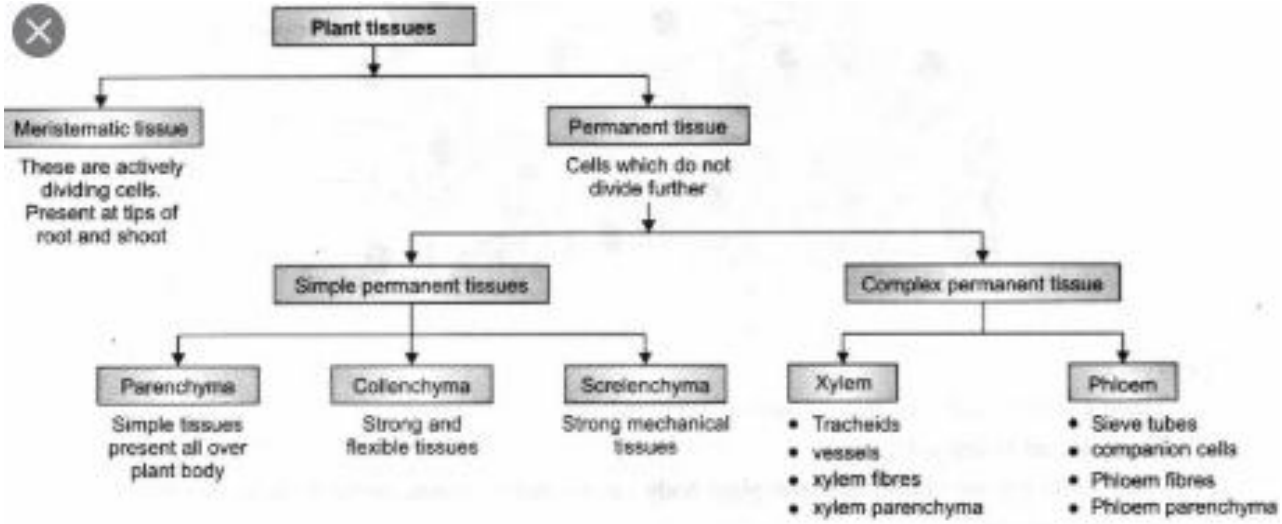
Ans. It is a protective layer to the plant parts. It can also absorb water from soil like in the roots and even allow exchange of gases through stomata. It also helps in preventing the entry of pathogens.

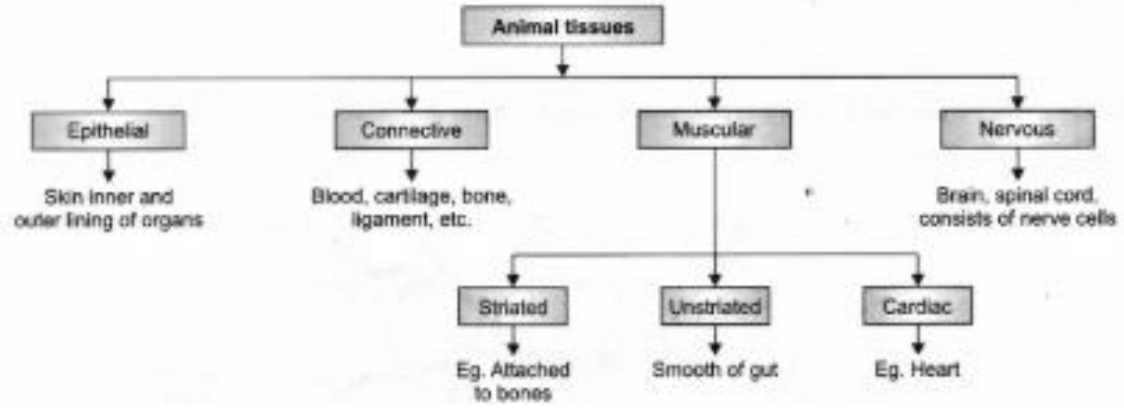
Ans. In plants the secondary meristem cuts off many external layers of cells that are dead and arranged in a compact manner. Such layers together make cork. They have deposition of suberin which is very hard and impermeable hence protects plants from unfavorable conditions and microbial attack etc.

15. Complete the table:

Ans.







Short Answer Questions

34. Animals of colder regions and fishes of cold water have thicker layer of subcutaneous fat. Describe why?

Ans. Fat acts as subcutaneous insulation of body for thermoregulation. The animals living in cold regions have various layers of fat so that the temperature of the body can be maintained and also because fats do not allow the internal heat to escape out of the body.

35. Match the column (A) with the column (B)

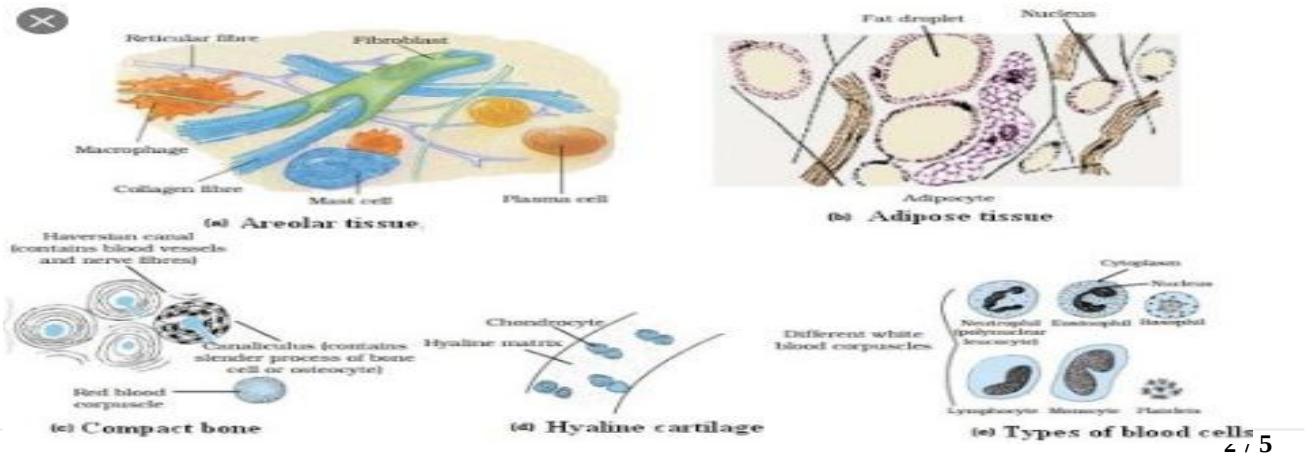
Column (A)	Column (B)
(a) Fluid connective tissue	(i) Subcutaneous layer
(b) Filling of space inside the organs	(ii) Cartilage
(c) Striated muscle	(iii) Skeletal muscle
(d) Adipose tissue	(iv) Areolar tissue
(e) Surface of joints	(v) Blood
(f) Stratified squamous epithelium	(vi) Skin

Ans. a—(v); b—(iv); c—(iii); d—(i); e—(ii); f—(vi);

36. Match the column (A) with the column (B)

Column A	Column B
(a) Parenchyma	(i) Thin walled, packing cells
(b) Photosynthesis	(ii) Carbon fixation
(c) Aerenchyma	(iii) Localized thickenings
(d) Collenchyma	(iv) Buoyancy
(e) Permanent tissue	(v) Sclerenchyma

Ans. a—(i); b—(ii); c—(iv); d—(iii); e—(v);

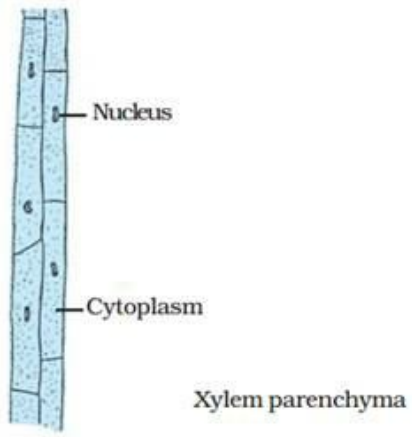


37. If a potted plant is covered with a glass jar, water vapours appear on the wall of glass jar. Explain why?

Ans. Transpiration takes place through stomata. Water vapour comes out of leaves during transpiration. When a potted plant is covered with a glass jar, water vapour (coming out because of transpiration) condenses on the wall of glass jar and hence it appears as fine droplets.

38. Name the different components of xylem and draw a living component?

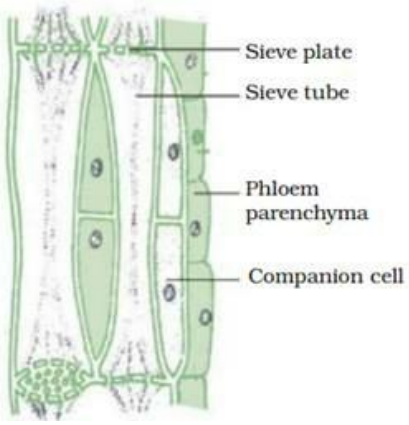
Ans. Xylem consists of tracheids, vessels, xylem parenchyma and xylem fibres.



Xylem parenchyma

39. Draw and identify different elements of phloem.

Ans. Sieve tubes, companion cells, phloem fibres and phloem parenchyma.



Section of phloem

40. Write true (T) or false (F)

(a) Epithelial tissue is protective tissue in animal body.

(b) The lining of blood vessels, lung alveoli and kidney tubules are all made up of epithelial tissue.

(c) Epithelial cells have a lot of intercellular spaces.

(d) Epithelial layer is permeable layer.

(e) Epithelial layer does not allow regulation of materials between body and external environment.

Ans. (a)—T, (b)—T, (c)—F, (d) —T, (e)—F

41. Differentiate between voluntary and involuntary muscles. Give one example of each type.

Ans.

Voluntary muscles	Involuntary muscles
(i) Their action is under our conscious control.	(i) Their action is not under our conscious control.
(ii) Cells are multinucleate.	(ii) Cells are uninucleate.
(iii) Example: Skeletal muscles	(iii) Example: Smooth muscle

42. Differentiate the following activities on the basis of voluntary (V) or involuntary (I V) muscles.

(a) Jumping of frog

(b) Pumping of the heart

(c) Writing with hand

(d) Movement of chocolate in your intestine

Ans. (a)—V, (b)—IV, (c)—V, (d) —IV

43. Fill in the blanks

(a) Lining of blood vessels is made up of _____.

Ans. squamous epithelium

(b) Lining of small intestine is made up of _____.

Ans. columnar epithelium

(c) Lining of kidney tubules is made up of _____.

Ans. cuboidal epithelium

(d) Epithelial cells with cilia are found in _____ of our body.

Ans. respiratory tract

44. Water hyacinth float on water surface. Explain.

Ans. A special type of parenchyma; called aernchyma is present in water hyacinth. This tissue has air-filled spaces inside and because the air gets trapped inside especially in the stem part so it becomes buoyant. Due to this, water hyacinth floats on water surface.

45. Which structure protects the plant body against the invasion of parasites?

Ans. Epidermis having thick cuticle and dermal tissue to prevent the invasion of parasites and other harmful agents.

46. Fill in the blanks

(a) Cork cells possesses _____ on their walls that makes it impervious to gases and water.
Ans. suberin

(b) _____ have tubular cells with perforated walls and are living in nature.
Ans. sieve tubes

(c) Bone possesses a hard matrix composed of _____ and _____.
Ans. calcium and phosphorus

47. Why is epidermis important for the plants?

Ans. Epidermis is important for plants due to the following reasons :

(i) it gives protection
(ii) helps in gaseous exchange
(iii) checks water loss
(iv) root hairs arising from epidermis helps in absorption of water and minerals.

(a) _____ are forms of complex tissue.

Ans. Xylem and phloem

(b) _____ have guard cells.

Ans. Stomata

(c) Cells of cork contain a chemical called _____.

Ans. Suberin

(d) Husk of coconut is made of _____ tissue.

Ans. Sclerenchyma

(e) _____ gives flexibility in plants.

Ans. Collenchyma

(f) _____ and _____ are both conducting tissues.

Ans. Xylem; phloem

(g) Xylem transports _____ and _____ from soil.

Ans. Water; minerals

(h) Phloem transport _____ from _____ to other parts of the plant.

Ans. food; leaves